TEKTRONIX®

1478

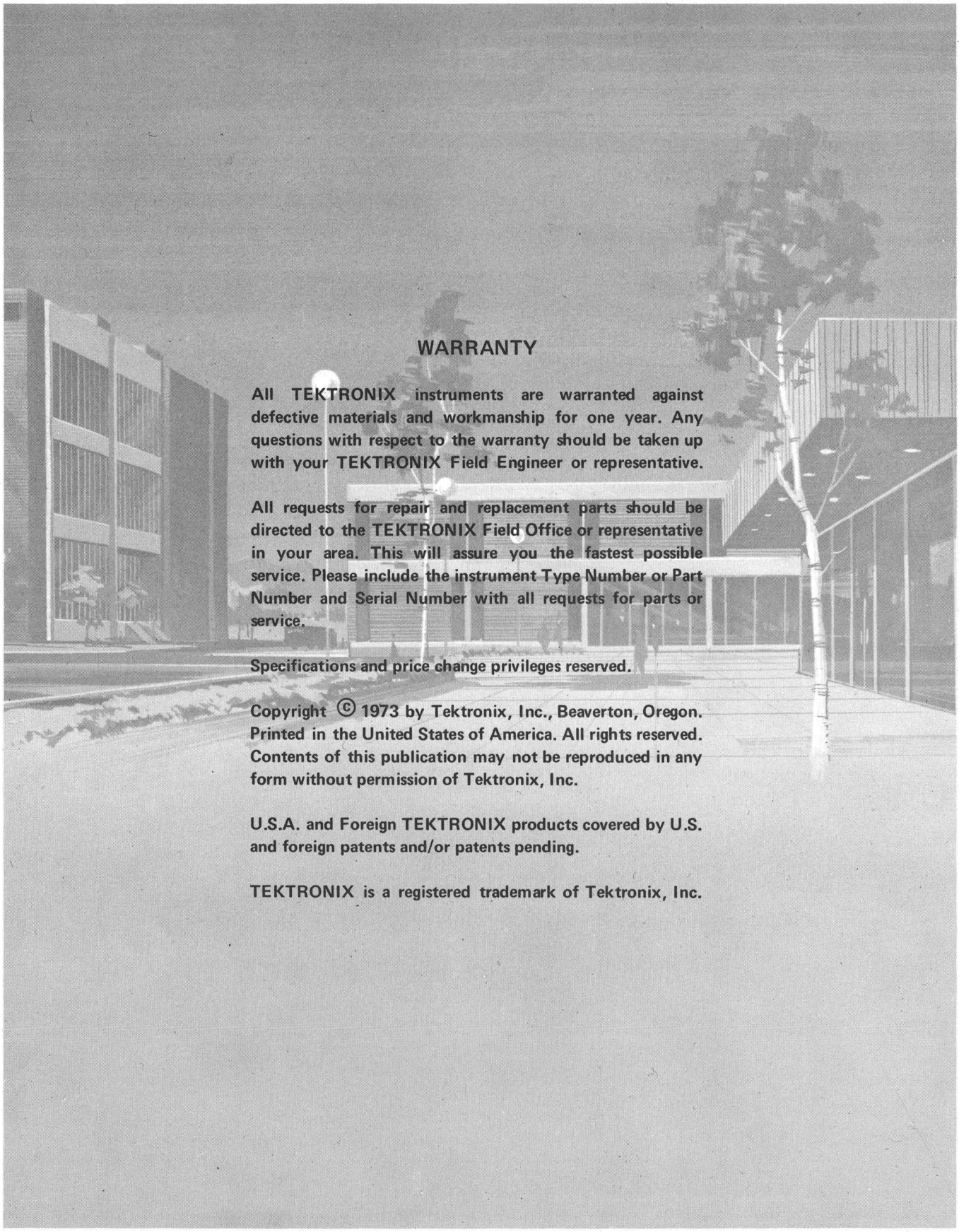
CALIBRATED CHROMINANCE LEVEL CORRECTOR

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97005

Serial Number _____

070-1640-00



WARRANTY

All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repair and replacement parts should be directed to the TEKTRONIX Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

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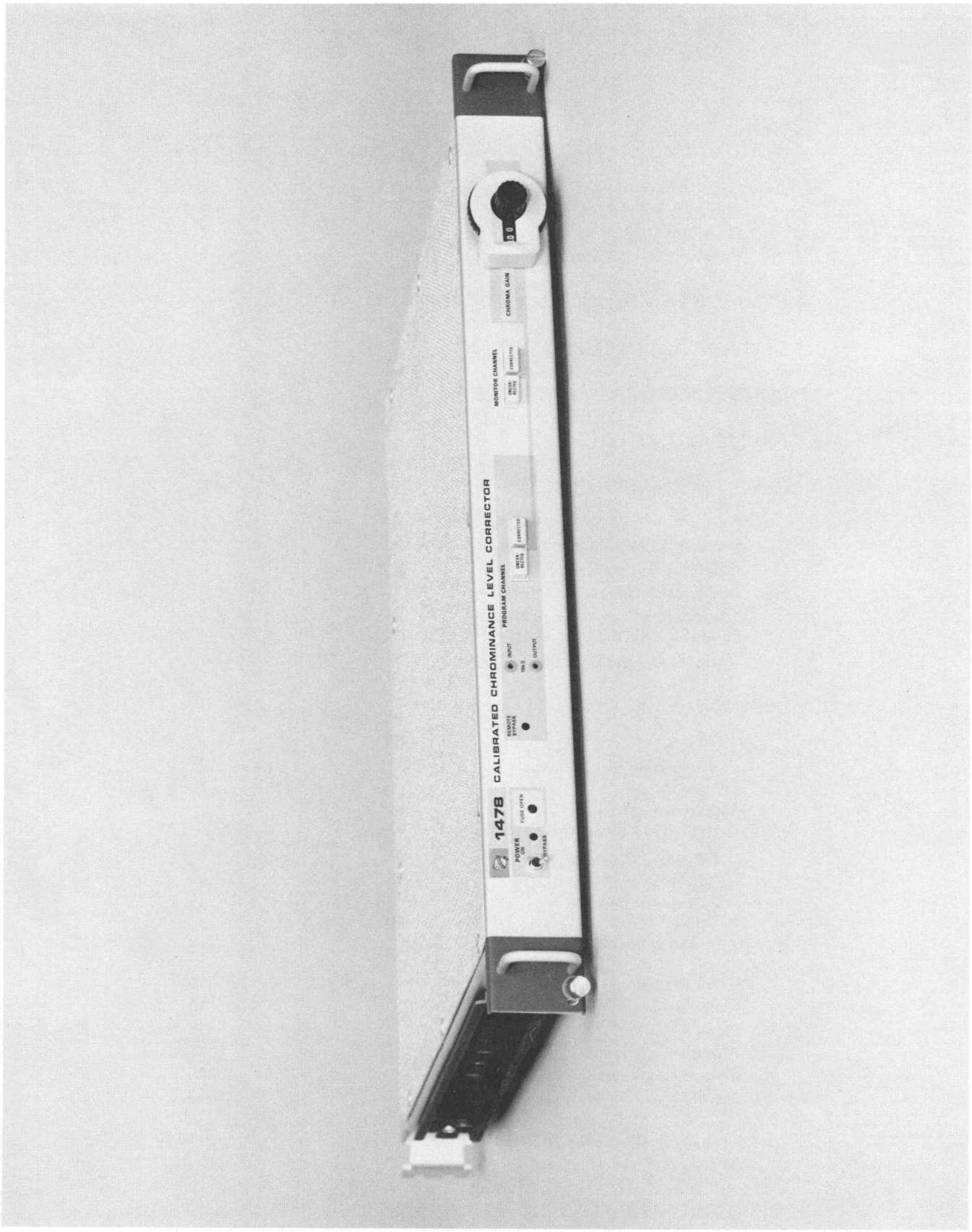


Fig. 1. The 1478 Calibrated Chrominance Level Corrector.

CALIBRATED CHROMINANCE LEVEL CORRECTOR

The 1478 CALIBRATED CHROMINANCE LEVEL CORRECTOR is for use with NTSC, PAL and PAL M color video signals. Using the modulated sine-squared pulse technique, relative chrominance to luminance gain errors can be manually corrected and the chrominance to luminance delay measured.

In addition to the in-line PROGRAM CHANNEL, the 1478 has a MONITOR CHANNEL, allowing the chrominance to luminance gain correction to be previewed prior to program line application. A waveform monitor, used in the MONITOR CHANNEL, allows direct measurement of the chrominance to luminance delay. The delay may also be plotted on nomograph. The waveform monitor used in the MONITOR CHANNEL can also be used for measuring other signal distortions.

Both the PROGRAM CHANNEL and the MONITOR CHANNEL are controlled by their own CORRECTED and UNCORRECTED pushbutton switches, allowing the chrominance gain correction to be applied to either or both channels. The CHROMA GAIN dial, used for the chrominance to luminance gain correction, is variable from 0.60 to 1.59 in .01 steps.

The continuity of the program line is protected by a bypass relay. The relay automatically bypasses the program line, through a delay line, in the event of a power failure. The 1478 may be removed from the equipment rack with minimum disruption of the program line; no time difference between the corrected or bypassed signal will be observed.

ELECTRICAL CHARACTERISTICS

The electrical performance requirements for this instrument are valid over the environmental limits at the end of this characteristics section. Calibration within an ambient temperature range of +20°C to +30°C and a warm-up period of 10 minutes are required prior to achieving stated accuracies.

TABLE 1

INPUT TO OUTPUT

Characteristic	Performance Requirement
Input Impedance (AC coupled)	75 Ω
Input Signal Level	Composite Video 1.0 V ±0.2 V Video Signal Only 0.7 V ±0.14 V
Through Gain	1 ±0.5%
Multi Burst Flatness	1% to 5 MHz
Chrominance Gain	3.58 & 4.43 MHz 0.60 to 1.59 (in .01 ±1% steps)
Phase Delay at 3.58 MHz Operating and Bypassed	≅215° (matched ±3°)
Time Delay Operating or Bypass	≅145 ns
Output DC Level (No Input Signal; input AC coupled)	0 V ±20 mV
Output Impedance	75 Ω
Return Loss Input	46 dB to 5 MHz
Output	34 dB to 5 MHz
Bypass	40 dB to 5 MHz

TABLE 2

CHROMINANCE TO LUMINANCE

Characteristic	Performance Requirement		
Relative Delay 3.58 & 4.43 MHz	5 ns or less		
Ø Shift With Chroma Gain Change	±1°		
2T Pulse: Bar Ratio	.70 ≅.92	1.0 .99–1.09	1.41 ≅1.10
2T Pulse Overshoot and Preshoot		1%	≅5%
T Pulse: Bar Ratio 100 ns HAD	≅.85	.98–1.02	≅1.20
125 ns HAD	≅.85	.98–1.02	≅1.20
T Step Overshoot 100 ns HAD		3%	≅7%
125 ns HAD		3%	≅5%
T Step Preshoot 100 ns HAD		3%	≅7%
125 ns HAD		3%	≅6%
T Step Risetime 100 ns HAD	≅140 ns		≅80 ns
125 ns HAD	≅155 ns		≅95 ns

TABLE 3

WAVEFORM DISTORTION

Characteristic	Performance Requirement	
Linear Distortions Field Time Tilt	0.5%	
Line Time Tilt	0.5%	
Short Time Distortion (ringing)	T Pulse 3%	2T Pulse 1%
Continuous Random Noise (unweighted)	−66 dB to 5 MHz	
Non-Linear Distortions Line Time Non-Linearity	0.5%	
Differential Gain	0.5%	
Differential Phase	0.5°	
Chrominance to Luminance Intermodulation	0.5%	
Dynamic Picture Gain	0.5%	
Dynamic Sync Gain	0.5%	

TABLE 4

BYPASS RELAY AND POWER

Characteristic	Performance Requirement
Relay Delay On	0.25 second or more
Off	One-fourth field or less
Line Voltage	115 or 230 VAC ±10%
Maximum Power Consumption	≅20 Watts

ENVIRONMENTAL CONSIDERATIONS

The 1478 requires calibration at +20 to 30°C and a warm-up of 10 minutes, at temperature, to operate within the stated performance requirements. The performance requirements for this instrument are valid over an operating temperature range of 0 to 50°C, at altitudes up to 15,000 feet. Additionally, storage (non-operating) at temperatures of −40 to +65°C and altitude variations up to 50,000 feet will not endanger performance.

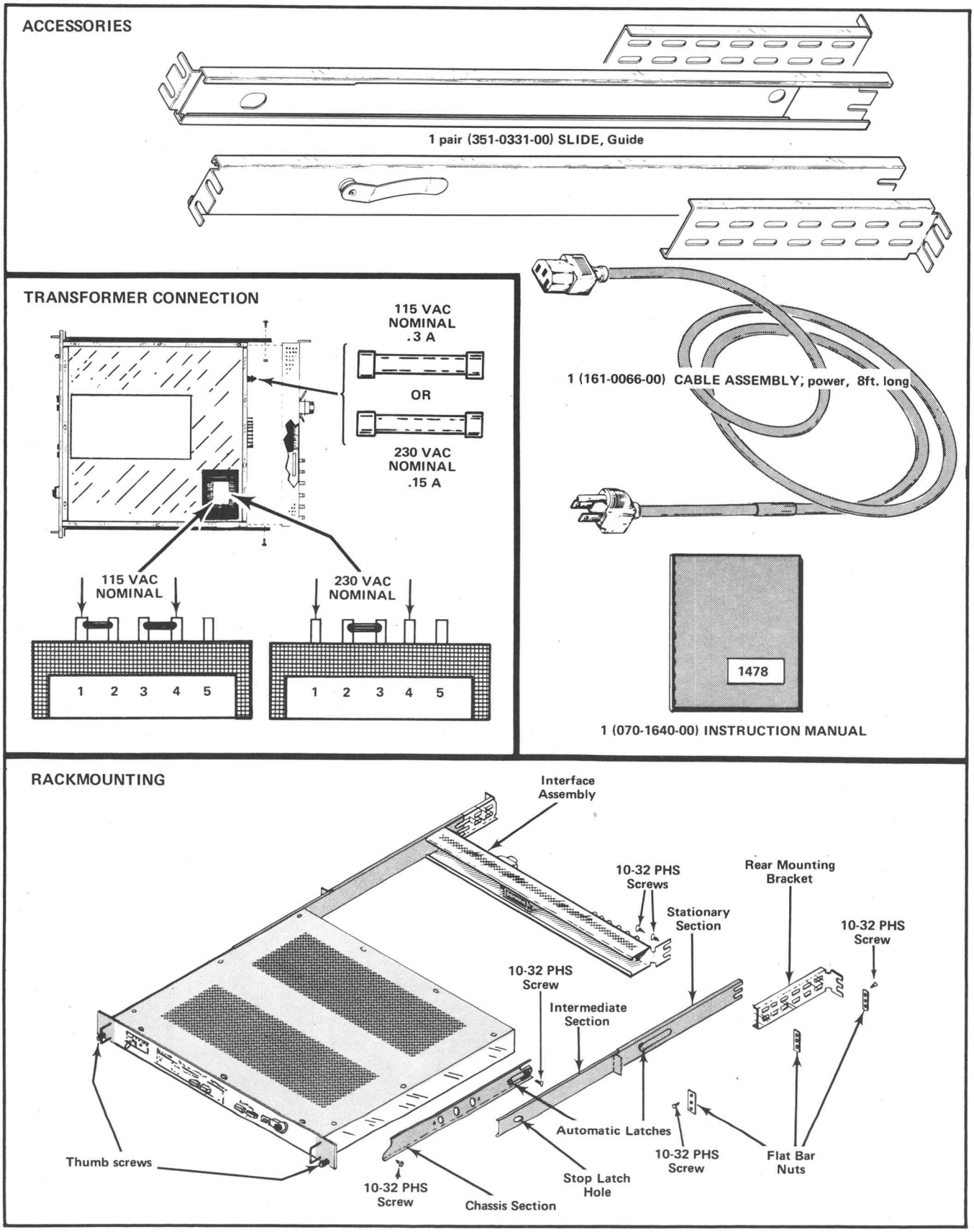
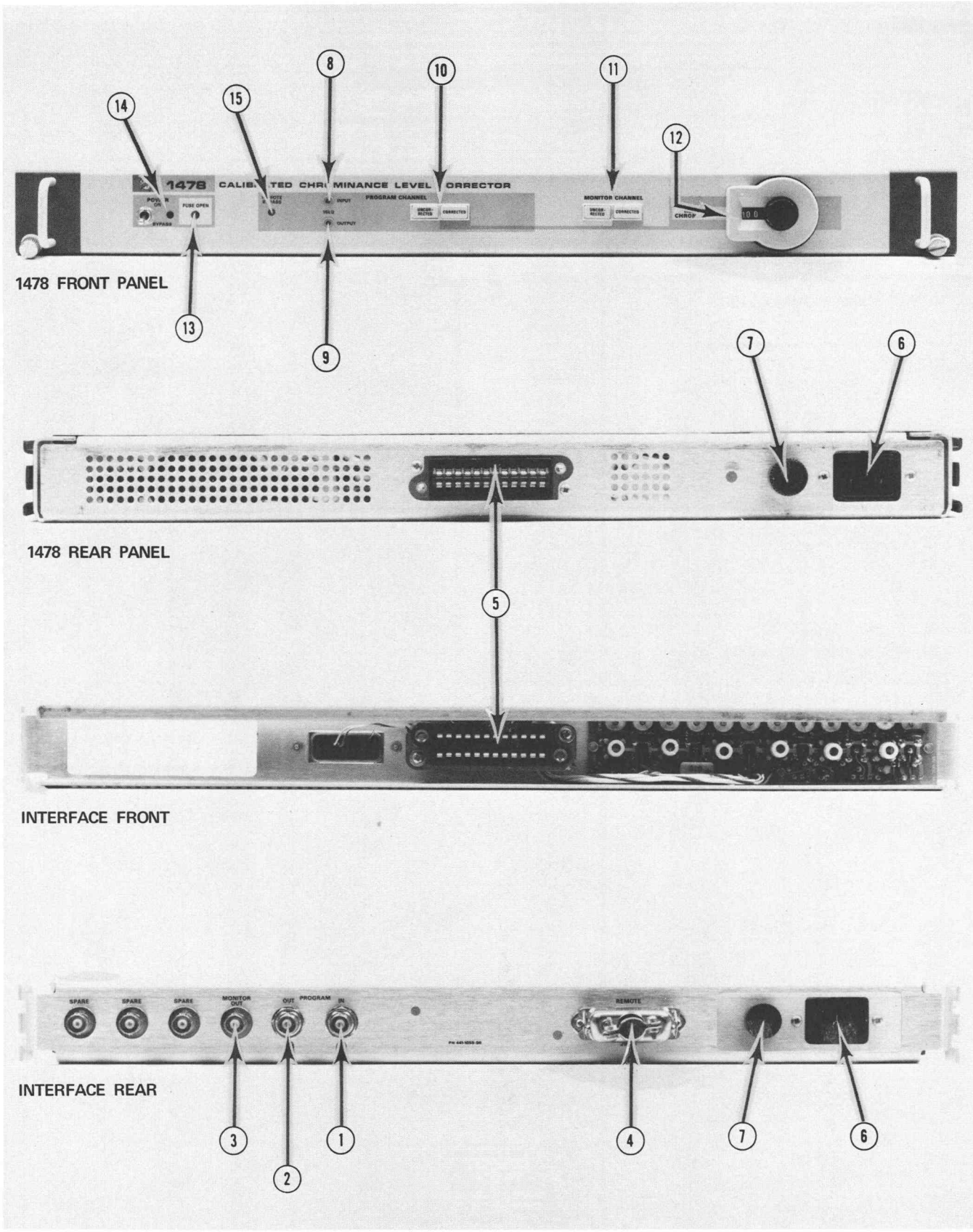


Fig. 2. 1478 Installation.


1478 FRONT PANEL
1478 REAR PANEL
INTERFACE FRONT
INTERFACE REAR
SPARE
SPARE
SPARE
MONITOR OUT
OUT
PROGRAM
IN
REMOTE
1
2
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4
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6
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10
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12
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14
15

Fig. 3.

CONNECTORS AND CONTROLS

Interface Connectors

(1) **Program In** — 75 Ω program signal line input.

(2) **Program Out** — Program signal output after signal processing in 1478, or bypassed through a delay line from Program In.

(3) **Monitor Out** — Provides a choice of previewing and monitoring the correction being applied to the program line, or monitoring the incoming uncorrected signal.

(4) **Remote** — Provides for remote control of bypass relay.

(5) — Interface to 1478 plug and jack assemblies provide the signal access to and from the 1478.

1478 Rear Panel

(6) **Power Plug**

(7) **Fuse Holder**

1478 Front Panel Connectors and Controls

(8) **Input** — High-impedance signal input test jack.

(9) **Output** — High-impedance signal output test jack.

(10) **Program Channel Corrected/Uncorrected** — Self-canceling pushbutton switch that applies the chroma gain correction to the program channel output amplifier.

(11) **Monitor Channel Corrected/Uncorrected** — Self-canceling pushbutton switch that applies the chroma gain correction to the monitor channel output amplifier.

(12) **Chroma Gain** — A dual switch assembly, with direct reading knobs, that controls the gain of the chroma correction.

(13) **Fuse Open** — Neon lamp lights if fuse is blown.

(14) **Power** — Toggle switch with green indicator lamp to indicate when power is present in the instrument. 1478 automatically returns to bypass when power switch is turned off.

(15) **Remote Bypass** — Light that indicates remote switching to the bypass mode. Controlled through the Remote connector on the interface.

TABLE 5

PHYSICAL SIZE

Characteristic	Performance Requirement
Dimensions	
Height	1.75 inches
Width	19.00 inches
Depth	16.89 inches (including interface)
Weight	
Net	≅10 lbs or 4.5 kg
Shipping	≅17 lbs or 7.7 kg

OPERATING INSTRUCTIONS

Placing The 1478 In The Program Line

Route the program line through the 1478 Interface PROGRAM IN and PROGRAM OUTPUT. Connect a waveform monitor to the MONITOR OUTPUT. Push both UNCORRECTED pushbuttons, set the CHROMA GAIN dial to 1.00, and apply power.

Correcting Chrominance Level

Display the Vertical Interval Test Signal on the waveform monitor. Use the Sin^2 Modulated Pulse, 10T, 12.5T or 20T, as the test signal.

Push the MONITOR CHANNEL CORRECTED pushbutton and adjust the CHROMA GAIN dial until the bottom of the modulation envelope crosses the baseline at the center of the pulse. This is a chrominance to luminance ratio of 1:1.

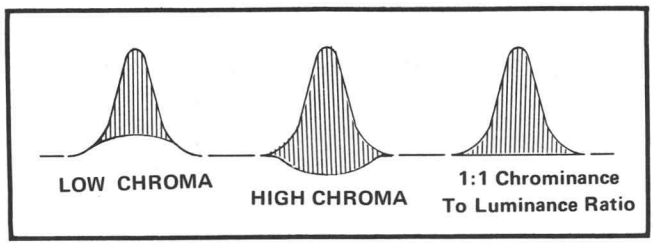


Fig. 4. Chroma Gain.

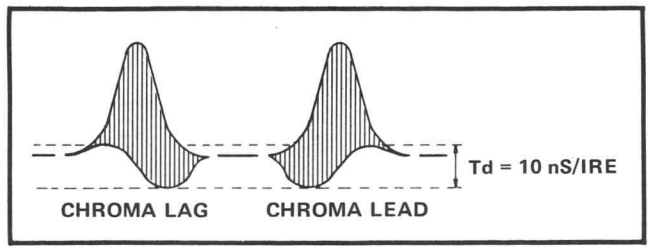


Fig. 5. Measuring Chroma Delay.

The CHROMA GAIN dial indicates the amount of correction required to restore a chrominance to luminance ratio of 1:1. If for example, the dial reads 1.41, a 41% (3 dB) boost in chrominance returns the ratio to 1:1. Conversely, if the dial reading is 0.70, a 30% (−3 dB) attenuation of the chrominance is required to restore the 1:1 chrominance to luminance ratio.

Input relative chrominance level is the reciprocal of the CHROMA GAIN dial indication

$$\left(RCL^{in} = \frac{1}{\text{chroma gain}}\right)$$. See Table 6.

Measuring Chroma Delay

After the chrominance level is corrected, the chroma delay can be measured. Chroma delay is determined by the envelope variation from the baseline. Chroma delay is 10 ns per IRE unit of baseline offset (peak to peak).

Applying Chrominance Correction

The chrominance level correction is applied to the program line by depressing the PROGRAM CHANNEL CORRECTION pushbutton. The program line correction can be continuously monitored by keeping the correction applied to the MONITOR CHANNEL.

The Monitor Channel

The monitor and program channel amplifiers operate independently, making it possible to continue to monitor the chroma corrected output or the uncorrected input signal. Additionally, if desired, the waveform monitor may be used for other measurements within its capability.

Bypassing The 1478

If the 1478 line voltage source is interrupted or the POWER switch is turned off, the program line switches to bypass. The program line is bypassed through a passive

TABLE 6

Determing Measured Value of Relative Chroma Level from Chroma Gain.

Dial Reading → / ↑	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.6	1.67	1.64	1.61	1.59	1.56	1.54	1.52	1.49	1.47	1.45
.7	1.43	1.41	1.39	1.37	1.35	1.33	1.32	1.30	1.28	1.27
.8	1.25	1.23	1.22	1.20	1.19	1.18	1.16	1.15	1.14	1.12
.9	1.11	1.10	1.09	1.08	1.06	1.05	1.04	1.03	1.02	1.01
1.0	1.00	.99	.98	.97	.96	.95	.94	.93	.93	.92
1.1	.91	.90	.89	.88	.88	.87	.86	.85	.85	.84
1.2	.83	.83	.82	.81	.81	.80	.79	.79	.78	.78
1.3	.77	.76	.76	.75	.75	.74	.74	.73	.72	.72
1.4	.71	.71	.70	.70	.69	.69	.68	.68	.68	.67
1.5	.67	.66	.66	.65	.65	.65	.64	.64	.63	.63

If the dial reading, for example, is 1.41 (1.4 +.01) the relative chroma level is .71.

delay line equal to the 1478 operating delay. Thus, there is no change in signal delay between the through and bypassed conditions.

Remote bypass is available through the REMOTE connector, located on the interface. A front panel REMOTE BYPASS indicator is provided to indicate when the 1478 has been bypassed from a remote source.

Increased Correction Range

If the 0.60 to 1.59 chroma gain correction range is insufficient, it is possible to modify the 1478 for a range of approximately 0 to 2.

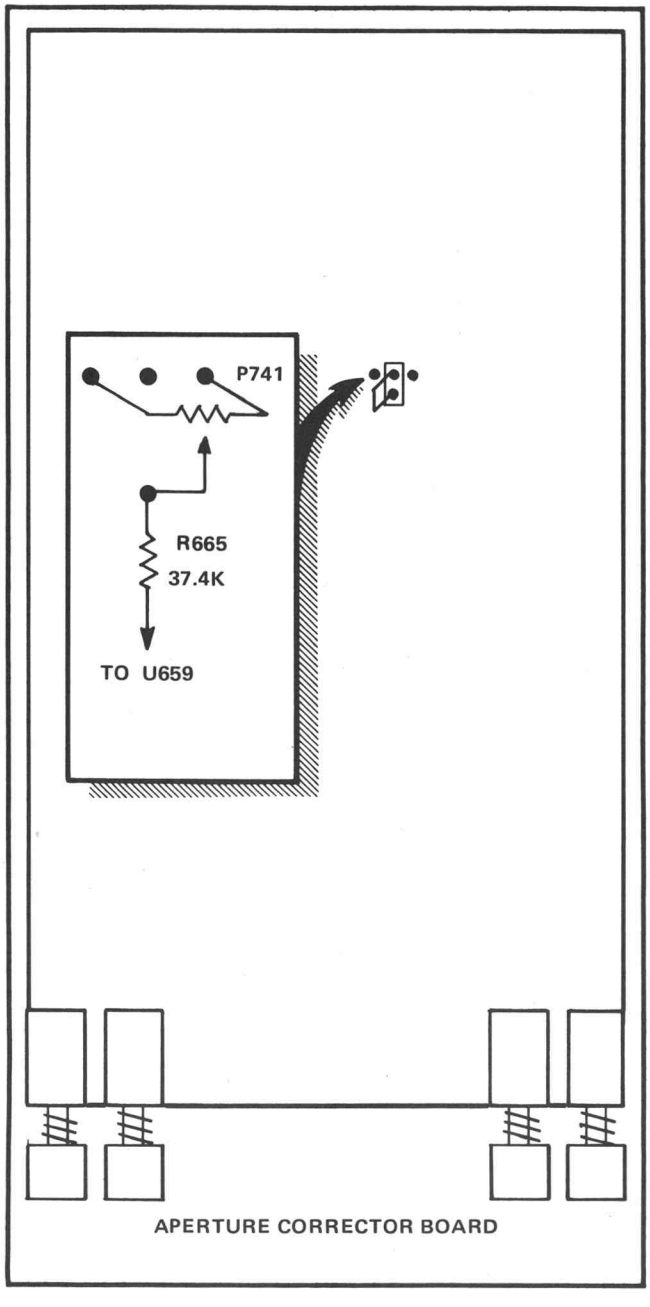


Fig. 6. Increasing Correction Range.

To change the gain range, remove P741 and install a 10 k variable resistor. When this resistor is set to the +15 volt end, the relative chroma level is 2; at the −15 volt end, all chroma is canceled. Adjustment of R567 may be necessary to null chroma to 0 (refer to adjustment procedure step 12 to readjust chroma gain).

SERVICING

A routine servicing program can forestall or avert many failures. The severity of the operating environment sets the frequency of routine servicing, however, we recommend a calibration check after 1000 hours or six months of operation. Recalibration should always be preceded by a thorough cleaning and visual inspection.

Cleaning

The accumulation of dust within the 1478 can cause damage as well as mar the appearance of the instrument. The best method of removing loose dust is with low velocity air. Then, use a soft cloth dampened with a solution of mild detergent and water, plus cotton swabs and a paint brush to remove any remaining dirt.

Do not use harsh detergents, solvents that dissolve plastics, or large amounts of water to clean this instrument.

Visual Inspection

A superfical inspection of the 1478 should be all that is necessary, unless some unusual operation has been observed. Look for heat damage, loose connections or plugs, improperly seated ICs or transistors, damaged switches, or other obvious damage.

Lubrication

The CHROMA GAIN switch should be lubricated occasionally. The detents should be lubricated with a non-conductive lubricant, formulated for this purpose. Use a contact cleaning form of lubricant on the rotors and contacts. Do not over-lubricate.

Transistor and Integrated Circuit Testing

We discourage removing transistors and integrated circuits from their sockets for routine testing.

Replacement Parts

All replacement parts for Tektronix instruments are available from Tektronix, Inc. Our nearest Field Office or representative will be glad to assist you in their procurement. Many of the components used in this instrument are

available from local parts distributors. Local purchase of common parts will reduce the time required for repairs. Be sure to check the parts list for a complete description before ordering or replacing any part.

Some components used in Tektronix instruments are designated as special parts. They are selected or manufactured by Tektronix, Inc., to meet specific performance requirements. Special parts are always identified in the parts list column headed Description.

When ordering replacement parts from Tektronix, Inc., please include the following information:

1. Instrument type.

2. Instrument serial number.

3. Circuit number and description from the parts list.

4. The Tektronix part number of the component.

PROCEDURE FOR RECALIBRATION

The following readjustment procedure may also be used as a checkout. If any adjustments are made, complete readjustment and checkout should be performed to remove all interaction.

When the procedure calls for a specific signal, refer to that signal generator instruction manual for its operating instructions.

Test Equipment Required

The following instruments and accessories are required for recalibration. The Tektronix instrument types that are used for factory calibration appear in parentheses. Other equipment with equal or superior specifications will also suffice.

1. NTSC Test Signal Generator (149A) or (148) Insertion Test Signal Generator for PAL signals

2. Vectorscope NTSC (520A), PAL (521A) or PAL M (522A)

3. Waveform Monitor NTSC (529) or PAL & PAL M (529-188D)

4. Test Oscilloscope with Differential Comparator Amplifier plug-in (547 with 1A5)

5. Return Loss Bridge (Tektronix 015-0149-00)

6. Constant-Amplitude Signal Generator (191)

7. 50 Ω to 75 Ω minimum loss attenuator (Tektronix 011-0057-00)

8. Chopped Voltage Reference (Tektronix 067-0596-00)

9. 75 Ω Voltage Step-up Termination (Tektronix 011-0100-01) NTSC; (Tektronix 011-0109-00) PAL

10. DC voltmeter

11. Variable autotransformer

Adjustment Procedure

1. Adjust Interface Return Loss

a. Disconnect the 1478 from the Interface. Use the Return Loss Bridge, driven with a 250 mV constant amplitude signal, to check return loss at both PROGRAM IN and OUT. Consult the Return Loss Bridge instruction manual for operating instructions. Check return loss at a number of frequencies up to 5 MHz.

b. If return loss is −40 dB or more, disregard the remainder of this step.

c. Drive the Input of the Return Loss Bridge with the Sin^2 Modulated Pulse and Bar signal from the Test Signal Generator. Use test oscilloscope delaying sweep to place only the T pulse on the test oscilloscope graticule. Adjust the bypass delay line variable capacitors for minimum amplitude and ringing.

d. Recheck return loss with the constant amplitude signal.

2. Check Power Supply Regulation

Install the 1478 into the Interface and plug the line cord into the variable autotransformer. Turn the 1478 POWER ON. Use the DC voltmeter to check for approximately −15 volts and +15 volts. Vary the autotransformer and check for constant power supply voltages 10% above and below the rated line voltage (115 VAC ±10% or 230 VAC ±10%).

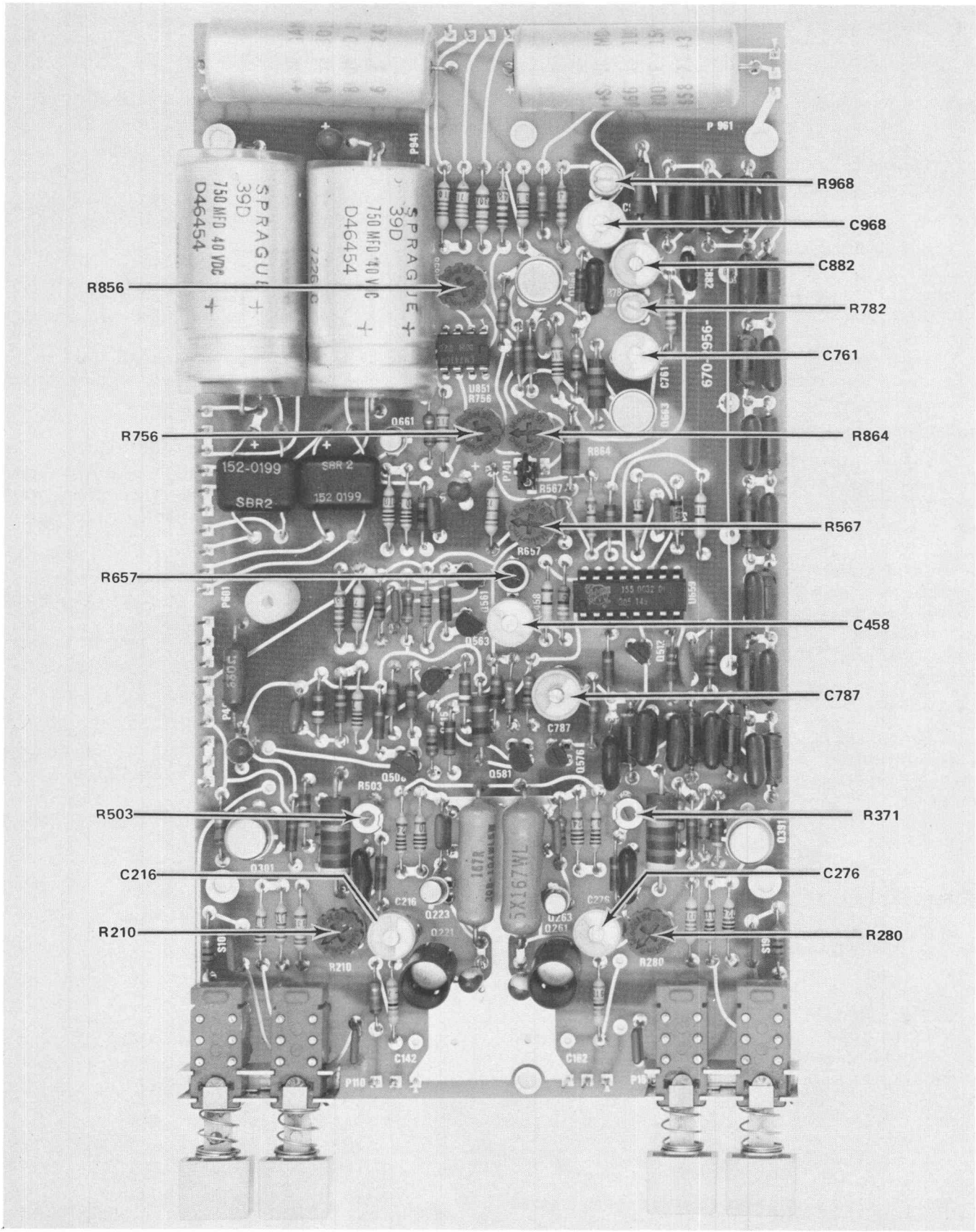


Fig. 7. Adjustment Locations.

3. Adjust 1478 Return Loss

a. Connect the unknown arm of the Return Loss Bridge to the 1478 PROGRAM IN. Drive the bridge with 250 mV of 50 kHz constant amplitude signal and adjust R968 for minimum display amplitude.

b. Change the driving signal to 5 MHz and adjust C968 for minimum display amplitude.

c. Check PROGRAM IN return loss, −46 dB or more; PROGRAM OUT return loss, −34 dB or more. It may be necessary to change the setting of R864, when checking PROGRAM OUT return loss, to bring the display on the screen.

4. Set Luminance Gains

a. Use the test oscilloscope in the differential mode to match the output of the Chopped Voltage Reference to a 50 IRE Full Field signal from the Test Signal Generator.

b. Apply the 50 IRE signal to the 1478 PROGRAM IN. Connect the 1478 PROGRAM OUT, along with the Chopped Voltage Reference, to the test oscilloscope vertical differential amplifier. Adjust the program amplifier Luminance Gain, R210, to match the Chopped Voltage Reference.

c. Connect the MONITOR OUT to the test oscilloscope vertical differential amplifier and adjust the monitor amplifier Luminance Gain, R280, to match the Chopped Voltage Reference.

5. Set The Output DC Level

a. Disconnect the 1478 PROGRAM IN signal and connect the PROGRAM OUT to the Waveform Monitor.

b. Turn off the 1478 and set the Waveform Monitor trace to the 0 IRE reference. Turn the 1478 POWER ON and adjust the Output DC Level, R864, to return the trace to the 0 IRE reference.

NOTE

The following six steps require signals from the Test Signal Generator and use the same monitors. In addition, these steps interact, so repeat them until there is no further need for adjustment.

Connections

Loop-thru connect the Vectorscope to the Waveform Monitor and the 1478 PROGRAM OUT. Terminate in 75 Ω. Connect the Modulated Sin^2 Pulse and Bar signal from the Test Signal Generator to the 1478 PROGRAM IN.

6. Adjust T Pulse Response

Observe the Waveform Monitor and adjust R782 and C882 for the least ringing following the T pulse.

7. Adjust Multiburst Flatness

Change the input signal to Multiburst and connect the test oscilloscope probe to the junction of R720 and R745. Adjust C761 for optimum flat top and bottom to the multiburst packets. Remove the test oscilloscope probe.

8. Adjust Program Channel Operating Delay

a. Change the input signal to Sin^2 Modulated Pulse and Bar and observe the Vectorscope. Turn off the 1478 POWER and position the vector to the horizontal graticule axis. Turn the 1478 POWER ON.

b. Adjust the program channel Operating Delay, C216, to return the vector to the horizontal axis.

9. Adjust Program Channel Chroma Gain

Observe the Waveform Monitor display and adjust the program channel Chroma Gain, R503, for a flat baseline under the modulated pulse and equal T pulse and bar amplitudes.

10. Adjust Chroma Phase

a. Observe the Vectorscope display. Remove P741 and connect a 10 kΩ variable resistor so that the voltage at R665 can swing between +15 V and −15 V (see Fig. 6, in the operating instructions). Depress PROGRAM CHANNEL CORRECTED.

b. Rotate the 10 kΩ variable resistor back and forth and adjust C458 and R657 to pass the vector tip through 0 on the horizontal axis. Adjustment of R567 may be necessary to pass the vector tip through zero.

11. Adjust T Pulse Tracking

a. Depress the PROGRAM CHANNEL UNCORRECTED and observe the Waveform Monitor. Set the variable resistor for 5 to 10 IRE units of T pulse negative preshoot and baseline overshoot.

b. Adjust T Pulse Tracking, C787, for equal amounts of preshoot and baseline overshoot.

NOTE

The preceding six steps interact; repeat them until no further adjustment is necessary. Remove the variable resistor and replace P741 before proceeding.

12. Adjust Chroma Gain Correction

a. Apply the Modulated Linearity signal from the Test Signal Generator to the 1478 PROGRAM INPUT. Connect the PROGRAM OUT through a 75 Ω Voltage Step-up Termination to one input of the test oscilloscope differential plug-in. Connect the output of the Chopped Voltage Reference to the other differential input.

b. Depress the PROGRAM CHANNEL UNCORRECTED and bring the chroma packets together, but not overlapped, with the Chopped Voltage Reference. This is an uncorrected gain of one.

c. Depress the PROGRAM CHANNEL CORRECTED and set the CHROMA GAIN dial to 1.00. Adjust the Chroma Correction Gain, R567, until the chroma packets again meet. This is the corrected chroma gain of one.

13. Adjust Chroma Gain Tracking

a. Read the Chopped Voltage Reference dial. The dial reading is for a gain of one. Multiply this reading by 1.5 and 0.6 to determine the Chopped Voltage Reference settings used for adjusting the CHROMA GAIN dial tracking.

b. Set the Chopped Voltage Reference to the calculated 1.5 setting and set the CHROMA GAIN dial to 1.50.

c. Adjust the X1.5 Gain, R756, until the chroma packets meet.

d. Set the Chopped Voltage Reference to the calculated 0.6 setting and set the CHROMA GAIN dial to .60.

e. Adjust the X0.6 Gain, R856, until the chroma packets meet.

14. Adjust Monitor Channel Operating Delay

a. Connect the Vectorscope to the 1478 PROGRAM OUT. Connect the Modulated Sin^2 Pulse and Bar signal from the Test Signal Generator to the 1478 PROGRAM IN.

b. Turn the 1478 POWER off (placing the 1478 in the bypassed mode) and set the vector on the horizontal graticule axis. Move the output cable to the MONITOR OUT and turn the 1478 POWER ON.

c. Adjust the monitor channel Operating Delay, C276, to return the vector to the horizontal graticule axis.

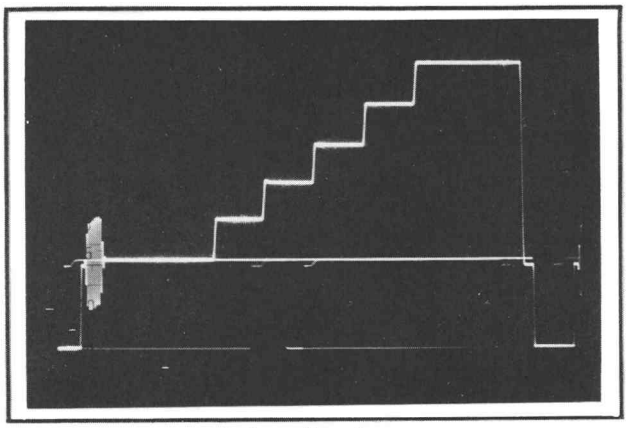
15. Adjust Monitor Channel Chroma Gain

a. Connect the Waveform Monitor to the MONITOR OUT. Check to see that the Modulated Sin^2 Pulse and Bar signal is displayed.

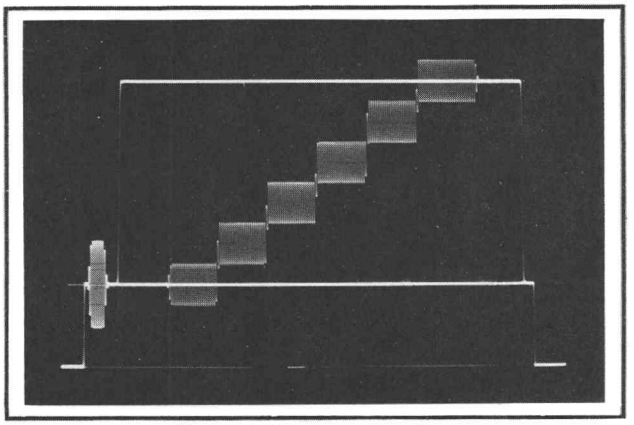
b. Adjust the monitor channel Chroma Gain, R371, for a flat base line under the modulated pulse and equal T pulse and bar amplitudes.

16. Calibration Checks

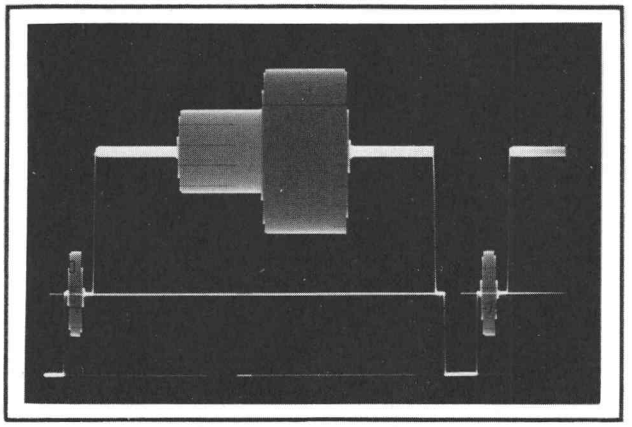
The following checks should be made; however, some or all can be deleted if the parameters involved are not critical. The table is arranged by the signal monitors required.



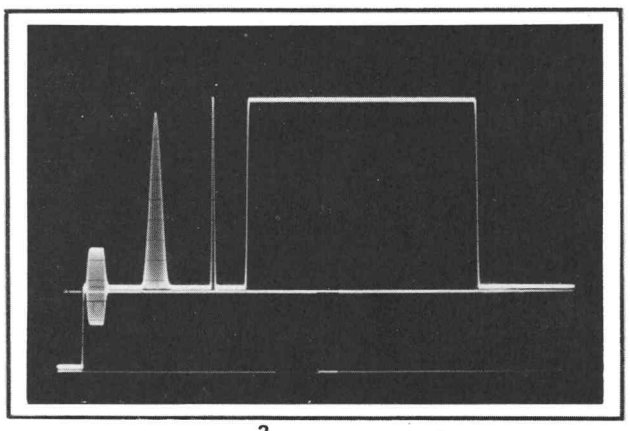
Staircase Waveform



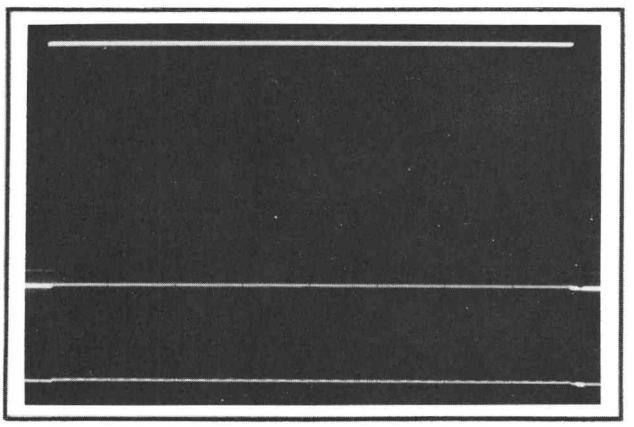
Modulated Staircase Waveform
(Variable APL)



Modulated Pedestal waveform



Modulated Sin^2 Pulse & Bar Waveform



Field Rate Squarewave

Fig. 8. Signals Required For Calibration Checks.

TABLE 7

CALIBRATION CHECKS

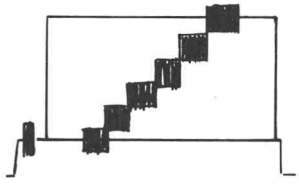
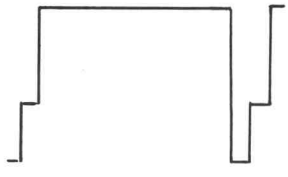
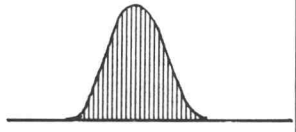
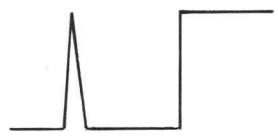
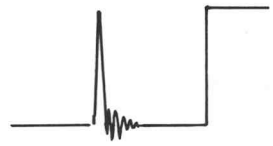
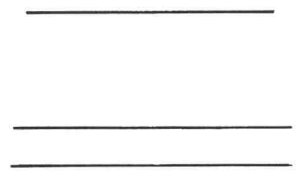
Test	Signal Required	Tolerance	
	Vectorscope		
Differential Gain	Staircase	0.5%	
Differential Phase	Staircase	0.5°	
Line Time Non-Linearity (use luminance mode)	Staircase	0.5%	
	Waveform Monitor		
Dynamic Picture Gain	Variable APL (10–90)	0.5%	
Dynamic Sync Gain	Variable APL (10–90)	0.5%	
Chrominance: Luminance Intermodulation (low pass)	Modulated Pedestal (Variable APL 40–70)	0.5%	
Chrominance: Luminance Relative Delay	Modulated Sin^2 Pulse and Bar	⩽5 ns	

TABLE 7 (cont)

	Test Oscilloscope		
2T Pulse: Bar Ratio	Modulated Sin^2 Pulse and Bar	.99–1.01:1	
2T Pulse Preshoot & Baseline Overshoot	Modulated Sin^2 Pulse and Bar	1%	
T Pulse: Bar Ratio	Modulated Sin^2 Pulse and Bar	.98–1.02:1	
T Step Preshoot & Overshoot	Modulated Sin^2 Pulse and Bar	3%	
T Step Risetime	Modulated Sin^2 Pulse and Bar	125 ns (NTSC) 100 ns (PAL)	
Line Time Tilt	Modulated Sin^2 Pulse and Bar	0.5%	
Field Time Tilt	Field Rate Square Wave	0.5%	

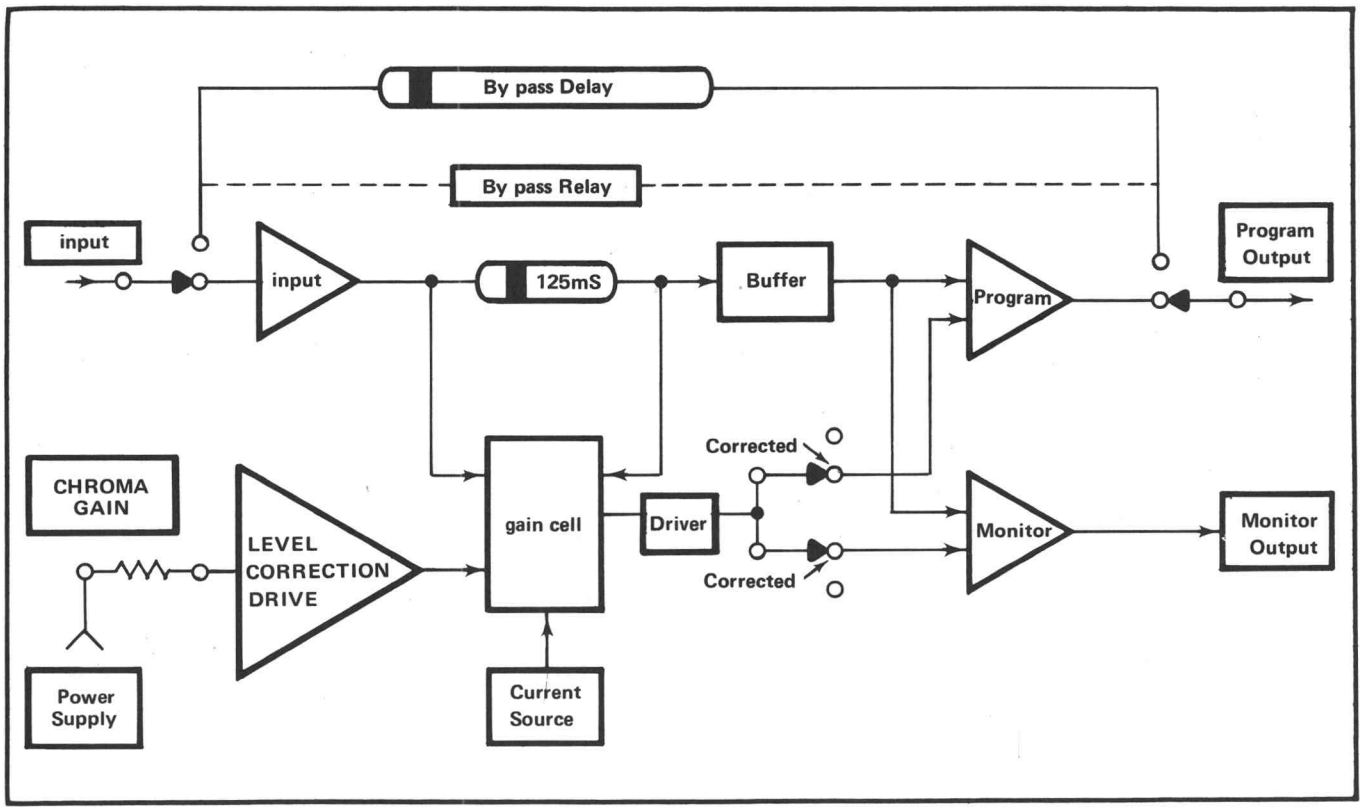


Fig. 9. Block Diagram.

CIRCUIT DESCRIPTION

Interface

The Interface provides a constant program line, either through or around the 1478, and signal access to and from the 1478.

The program line is controlled by K475, which operates as a normally-open quick-release circuit, allowing rapid switching to bypass when power is lost. The relay is delayed at turn-on to allow the 1478 to stabilize prior to applying the program line.

The relay is controlled by turning Q642 on and off. Q742 turns on Q642 after a period determined by the time constant of R775 and C875 (≅.5 second). Conversely, Q642 turns off instantly when power loss occurs. The charge on C570 is coupled through CR675 to the base of Q642, holding it up, while the emitter starts down, causing the relay to switch to bypass in less than one-fourth field.

Remote bypass is available through the REMOTE plug located on the Interface rear panel. Whenever the ground path through the REMOTE plug is opened, K475 opens and Q340 is turned on. When Q340 is on, the front panel REMOTE BYPASS indicator is lit.

Input Amplifier

The input amplifier is an inverting operational amplifier, consisting of Q864, Q663 and Q661. The amplifier gain is about 1.3. Input signal termination is C968 and R968, C761 sets flatness, and R864 is the output DC level adjust.

A front panel pin jack test point, allows access to the input signal. The jack is isolated from the input program line by R960.

Aperture Corrector

The signal from the input amplifier drives the 75 Ω aperture corrector delay line. The output end of the delay line drives the base of Q576, a relatively high impedance. The delay line output is unterminated and any reflections are absorbed by the source termination, R782, R795 and C882. The total delay is approximately 125 ns.

Differential inputs to the gain cell, U659 are taken from opposite ends of the delay line. At approximately 4 MHz, the maximum phase difference (180°) occurs across the delay line. This is also the point of maximum possible gain change. C787 adjusts delay for equal gain at 3.58 and 4.43 MHz. The gain output of U659 is a function of current into pin 12.

The current at pin 12 is proportional to the output voltage of U851, which is a direct function of the CHROMA GAIN switch. A positive voltage at the output of U851 causes an in phase, or additive, chroma correction at the emitter of Q508. A negative voltage out of U851 causes an out of phase, or subtractive, chroma correction.

C458 and R657 match the delay of the through signal at Q581 and the correction signal at Q508, to eliminate phase shift when the chroma level is changed.

Output Amplifiers

The through and correction signals are summed at the input of the output amplifiers. The correction signal can be applied to either or both of the identical operational amplifiers. Amplifier gain is about 1.5 and set by R210 and R280. C216 and C276, along with R503 and R371, set the flatness and match the through delay to the bypass delay.

A front panel pin jack test point, allows access to the output signal. The jack is isolated from the output program line by R150.

Power Supply

The power supply for the 1478 provides + and −15 volts. These supplies are not adjustable, their voltage is fixed by the integrated circuit voltage regulators. Full wave bridge rectification is employed in conjunction with the integrated circuit voltage regulators. The regulator circuits are identical, except that the −15 volt regulator has the output and common leads reversed to provide minus output voltage.

The power transformer has a split primary winding allowing rapid conversion for 234 VAC line source. A FUSE OPEN indicator along with a POWER ON light are provided on the front panel.

ELECTRICAL REPLACEABLE PARTS LIST

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

ACTR	ACTUATOR
ASSY	ASSEMBLY
CAP	CAPACITOR
CER	CERAMIC
CKT	CIRCUIT
COMP	COMPOSITION
CONN	CONNECTOR
ELCTLT	ELECTROLYTIC
ELEC	ELECTRICAL
FXD	FIXED
INCAND	INCANDESCENT
LED	LIGHT EMITTING DIODE
NONWIR	NON WIREWOUND
PLSTC	PLASTIC
QTZ	QUARTZ
RECP	RECEPTACLE
RES	RESISTOR
RF	RADIO FREQUENCY
SEL	SELECTED
SEMICOND	SEMICONDUCTOR
SENS	SENSITIVE
SEP	SEPARATELY
VAR	VARIABLE
WW	WIREWOUND
XFMR	TRANSFORMER
XTAL	CRYSTAL

CROSS INDEX

MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
00853	Sangamo Electric Co., S. Carolina Div.	P. O. Box 128	Pickens, SC 29671
01121	Allen-Bradley Co.	1201 2nd St.	Milwaukee, WI 53212
02660	Bunker-Ramo Corp., The, Amphenol Connector Div.	2801 S. 25th Ave.	Broadview, IL 60153
04713	Motorola, Inc., Semiconductor Products Div.	5005 E. McDowell Rd.	Phoenix, AZ 85008
07263	Fairchild Semiconductor, A Div. of Fairchild Camera and Instrument Corp.	464 Ellis St.	Mountain View, CA 94040
07910	Teledyne Semiconductor	12515 Chadron Ave.	Hawthorne, CA 90250
08806	General Electric Co., Miniature Lamp Dept.	Nela PK.	Cleveland, OH 44112
09353	C and K Components, Inc.	103 Morse Street	Watertown, MA 02172
12040	National Semiconductor Corp.	Commerce Drive	Danbury, CT 06810
24931	Specialty Connector Co., Inc.	3560 Madison Ave.	Indianapolis, IN 46227
56289	Sprague Electric Co.		North Adams, MA 01247
63743	Ward, Leonard, Electric Co.	31 South St.	Mount Vernon, NY 10550
71400	Bussman Mfg., Division of McGraw Edison Co.	2536 W. University St.	St. Louis, MO 63107
71744	Chicago Miniature Lamp Works	4433 Ravenswood Ave.	Chicago, IL 60640
71785	TRW Electronic Components, Cinch Div.	1501 Morse Ave.	Elk Grove Village, IL 60007
72136	Electro Motive Mfg. Co., Inc., The	South Park and John Streets	Willimantic, CT 06226
72982	Erie Technological Products, Inc.	644 W. 12th St.	Erie, PA 16512
73138	Beckman Instruments, Inc., Helipot Div.	2500 Harbor Blvd.	Fullerton, CA 92634
75042	TRW Electronic Components, IRC Philadelphia Div.	401 N. Broad St.	Philadelphia, PA 19108
80009	Tektronix, Inc.	P. O. Box 500	Beaverton, OR 97005
80294	Bourns, Inc.	1200 Columbia Av.e	Riverside, CA 92507
80740	Beckman Instruments, Inc.	2500 Harbor Blvd.	Fullerton, CA 92634
81483	International Rectifier Corp.	9220 Sunset Blvd.	Los Angeles, CA 90069
82389	Switchcraft, Inc.	5555 N. Elston Ave.	Chicago, IL 60630
90201	Mallory Capacitor Co.	3029 E. Washington St.	Indianapolis, IN 46206
91637	Dale Electronics, Inc.	P. O. Box 609	Columbus, NB 68601
98291	Sealectro Corp.	225 Hoyt	Mamroneck, NY 10544

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-2956-00			CKT BOARD ASSY:--APERTURE CORRECTOR	80009	670-2956-00
A2	670-3070-00			CKT BOARD ASSY:--RELAY/DELAY	80009	670-3070-00
C105	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C170	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C185	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C216	281-0091-00			CAP.,VAR,CER DI:2-8PF	72982	538-011-A2-8
C225	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C235	290-0527-00			CAP.,FXD,ELEC:15UF,20%,20V	90201	TDC156M020FL
C245	290-0527-00			CAP.,FXD,ELEC:15UF,20%,20V	90201	TDC156M020FL
C255	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C270	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C276	281-0091-00			CAP.,VAR,CER DI:2-8PF	72982	538-011-A2-8
C342	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C344	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C346	283-0601-00			CAP.,FXD,MICA D:22PF,10%,300V	00853	D15-3C220K0
C348	283-0669-00			CAP.,FXD,MICA D:360PF,1%,500V	72136	DM15F361F0500
C365	283-0636-00			CAP.,FXD,MICA D:36PF,+/-0.5PF,100V	00853	D15-1E360D0
C375	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D15-1E560F0
C442	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C444	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C446	283-0601-00			CAP.,FXD,MICA D:22PF,10%,300V	00853	D15-3C220K0
C448	283-0669-00			CAP.,FXD,MICA D:360PF,1%,500V	72136	DM15F361F0500
C458	281-0091-00			CAP.,VAR,CER DI:2-8PF	72982	538-011-A2-8
C480	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C505	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D15-1E560F0
C515	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C542	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C544	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C546	283-0601-00			CAP.,FXD,MICA D:22PF,10%,300V	00853	D15-3C220K0
C548	283-0669-00			CAP.,FXD,MICA D:360PF,1%,500V	72136	DM15F361F0500
C570	290-0527-00			CAP.,FXD,ELEC:15UF,20%,20V	90201	TDC156M020FL
C600	290-0527-00			CAP.,FXD,ELEC:15UF,20%,20V	90201	TDC156M020FL
C610	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	56289	20C205A1
C642	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C644	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C645	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C646	283-0637-00			CAP.,FXD,MICA D:20PF,+/-0.5PF,100V	00853	D15-1E200D0
C648	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15E331F05
C650	290-0527-00			CAP.,FXD,ELEC:15UF,20%,20V	90201	TDC156M020FL
C665	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C685	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8131-050651104M
C715	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	56289	40C626
C742	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C744	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C746	283-0637-00			CAP.,FXD,MICA D:20PF,+/-0.5PF,100V	00853	D15-1E200D0
C748	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15E331F05
C761	281-0091-00			CAP.,VAR,CER DI:2-8PF	72982	538-011-A2-8
C787	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C794	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D15-1E560F0
C800	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C806	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C812	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C818	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C824	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C830	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C836	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C840	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C842	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C844	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C846	283-0637-00			CAP.,FXD,MICA D:20PF,+/-0.5PF,100V	00853	D15-1E200D0
C848	283-0680-00			CAP.,FXD,MICA D:330PF,1%,500V	72136	DM15E331F05
C850	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C852	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C858	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C864	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C870	283-0603-00			CAP.,FXD,MICA D:113PF,2%,300V	00853	D15-3F1130G0
C875	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C876	283-0600-00			CAP.,FXD,MICA D:43PF,5%,500V	72136	DM10E430J0500
C880	283-0639-00			CAP.,FXD,MICA D:56PF,1%,100V	00853	D15-1E560F0
C882	281-0092-00			CAP.,VAR,CER DI:9-35PF	72982	538-011D9-35
C900	290-0324-00			CAP.,FXD,ELCTLT:750UF,+75-10%,40V	56289	39D757G040HJ4
C905	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C910	290-0324-00			CAP.,FXD,ELCTLT:750UF,+75-10%,40V	56289	39D757G040HJ4
C925	290-0369-00			CAP.,FXD,ELCTLT:800UF,+75-10%,15V	56289	39D807G015FJ4
C968	281-0091-00			CAP.,VAR,CER DI:2-8PF	72982	538-011-A2-8
C970	290-0369-00			CAP.,FXD,ELCTLT:800UF,+75-10%,15V	56289	39D807G015FJ4
CR675	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	CD8220
CR700	152-0199-00			SEMICOND DEVICE:SILICON,BRIDGE,200V,1500MA	81483	66-8039
CR710	152-0199-00			SEMICOND DEVICE:SILICON,BRIDGE,200V,1500MA	81483	66-8039
DS9400	150-0109-00			LAMP,INCAND:18V,26MA	71744	CM7220
DS9500	150-0035-00			LAMP,GLOW:90V,0.3MA	08806	A1D-T
DS9600	150-0109-00			LAMP,INCAND:18V,26MA	71744	CM7220
F9800	159-0042-00			FUSE,CARTRIDGE:0.75A,3AG,FAST-BLO	71400	AGC3-4
J9010	131-0148-00			CONN,RECP,ELEC:24 CONTACTS	02660	26-190-24-1004
J9014	131-0324-00			CONN,RECP,ELEC:24 PIN	71785	57-40240(398)
J9500	131-0779-00			JACK,TIP:GREY PLASTIC INSULATOR	98291	SKT-0804
J9550	131-0779-00			JACK,TIP:GREY PLASTIC INSULATOR	98291	SKT-0804
J9650	131-1084-00			CONN,RECP,ELEC:6A,250V	82389	EAC-301
J9943	131-1097-00			CONN,RECP,ELEC:BNC,FEMALE	24931	28JR220-1
J9963	131-1097-00			CONN,RECP,ELEC:BNC,FEMALE	24931	28JR220-1
J9983	131-1097-00			CONN,RECP,ELEC:BNC,FEMALE	24931	28JR220-1
K475	148-0034-00			RELAY ARMATURE:DPDT,15V	80009	148-0034-00
L350	108-0673-00			COIL,FXD:2.2UH	80009	108-0673-00
L450	108-0673-00			COIL,FXD:2.2UH	80009	108-0673-00
L550	108-0673-00			COIL,FXD:2.2UH	80009	108-0673-00
L650	108-0759-00			COIL,FXD:2UH	80009	108-0759-00
L750	108-0759-00			COIL,FXD:2UH	80009	108-0759-00
L800	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L805	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L810	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L815	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L820	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L825	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L830	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L840	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L845	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L850	108-0759-00			COIL,FXD:2UH	80009	108-0759-00
L855	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L860	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L865	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L870	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
L875	108-0072-00			COIL,FXD:0.75UH	80009	108-0072-00
P9010	131-0149-00			CONN,RECP,ELEC:24 CONTACT	02660	26-159-24
P9014	131-0325-00			CONN,PLUG,ELEC:24 PIN	71785	57-30240-398
Q221	151-0134-00			TRANSISTOR:SILICON,PNP	04713	2N2905A

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q223	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q261	151-0134-00			TRANSISTOR:SILICON,PNP	04713	2N2905A
Q263	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q301A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	12040	NS7348
Q340	151-0192-00			TRANSISTOR:SILICON,NPN	04713	SS2110
Q391A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	12040	NS7348
Q415	151-0410-00			TRANSISTOR:SILICON,PNP	04713	SPS6765
Q508	151-0367-00			TRANSISTOR:SILICON,NPN,SEL FROM 3571TP	80009	151-0367-00
Q512	151-1039-00			TRANSISTOR:SILICON,JFE,P CHANNEL	80009	151-1039-00
Q561	151-0410-00			TRANSISTOR:SILICON,PNP	04713	SPS6765
Q563	151-0367-00			TRANSISTOR:SILICON,NPN,SEL FROM 3571TP	80009	151-0367-00
Q576	151-0192-00			TRANSISTOR:SILICON,NPN	04713	SS2110
Q581	151-0325-00			TRANSISTOR:SILICON,PNP,SEL FROM 2N4258	80009	151-0325-00
Q642	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q661	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q663	151-0134-00			TRANSISTOR:SILICON,PNP	04713	2N2905A
Q742	151-0192-00			TRANSISTOR:SILICON,NPN	04713	SS2110
Q864A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	12040	NS7348
R100	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R150	315-0153-00			RES.,FXD,COMP:15K OHM,5%,0.25W	01121	CB1535
R175	321-0085-01			RES.,FXD,FILM:75 OHM,0.25%,0.125W	91637	MFF1816G75R00D
R180	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R200	321-0200-00			RES.,FXD,FILM:1.18K OHM,1%,0.125W	75042	CEAT0-1181F
R205	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R210	311-1564-00			RES.,VAR,NONWIR:500 OHM,20%,0.5W	73138	91A-500R0M
R215	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R220	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R230	308-0104-00			RES.,FXD,WW:167 OHM,1%,5W	63743	1852
R250	308-0104-00			RES.,FXD,WW:167 OHM,1%,5W	63743	1852
R260	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R265	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R270	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R275	321-0085-01			RES.,FXD,FILM:75 OHM,0.25%,0.125W	91637	MFF1816G75R00D
R280	311-1564-00			RES.,VAR,NONWIR:500 OHM,20%,0.5W	73138	91A-500R0M
R285	303-0471-00			RES.,FXD,COMP:470 OHM,5%,1W	01121	GB4715
R300	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R305	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R310	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R315	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R320	315-0471-00			RES.,FXD,COMP:470 OHM,5%,0.25W	01121	CB4715
R325	315-0302-00			RES.,FXD,COMP:3K OHM,5%,0.25W	01121	CB3025
R360	315-0912-00			RES.,FXD,COMP25W 9.1K OHM,5%,0.	01121	CB9125
R365	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R370	315-0752-00			RES.,FXD,COMP:7.5K OHM,5%,0.25W	01121	CB7525
R371	311-0635-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	80740	62-56-1
R375	315-0104-00			RES.,FXD,COMP:100K OHM,5%,0.25W	01121	CB1045
R380	315-0471-00			RES.,FXD,COMP:470 OHM,5%,0.25W	01121	CB4715
R385	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R390	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R395	315-0302-00			RES.,FXD,COMP:3K OHM,5%,0.25W	01121	CB3025
R400	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R410	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R415	321-0200-00			RES.,FXD,FILM:1.18K OHM,1%,0.125W	75042	CEAT0-1181F
R420	315-0391-00			RES.,FXD,COMP:390 OHM,5%,0.25W	01121	CB3915
R465	321-0296-00			RES.,FXD,FILM:11.8K OHM,1%,0.125W	75042	CEAT0-1182F
R470	321-0241-00			RES.,FXD,FILM:3.16K OHM,1%,0.125W	75042	CEAT0-3161F
R475	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R485	315-0472-00			RES.,FXD,COMP:4.7K OHM,5%,0.25W	01121	CB4725
R490	321-0145-00			RES.,FXD,FILM:316 OHM,1%,0.125W	75042	CEAT0-3160F

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R495	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R500	303-0471-00			RES.,FXD,COMP:470 OHM,5%,1W	01121	GB4715
R503	311-0635-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	80740	62-56-1
R510	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R520	315-0392-00			RES.,FXD,COMP:3.9K OHM,5%,0.25W	01121	CB3925
R525	315-0113-00			RES.,FXD,COMP:11K OHM,5%,0.25W	01121	CB1135
R530	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R535	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R540	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R545	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R550	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R555	315-0622-00			RES.,FXD,COMP:6.2K OHM,5%,0.25W	01121	CB6225
R560	301-0102-00			RES.,FXD,COMP:1K OHM,5%,0.50W	01121	EB1025
R565	315-0201-00			RES.,FXD,COMP:200 OHM,5%,0.25W	01121	CB2015
R567	311-1559-00			RES.,VAR,NONWIR:10K OHM,20%,0.5W	73138	91A-10001M
R570	315-0153-00			RES.,FXD,COMP:15K OHM,5%,0.25W	01121	CB1535
R575	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R580	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R585	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	75042	CEAT0-4990F
R590	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	75042	CEAT0-4990F
R595	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R600	315-0123-00			RES.,FXD,COMP:12K OHM,5%,0.25W	01121	CB1235
R610	308-0314-00			RES.,FXD,WW:680 OHM,5%,3W	63743	25697
R615	315-0202-00			RES.,FXD,COMP:2K OHM,5%,0.25W	01121	CB2025
R630	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R635	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	75042	CEAT0-1001F
R640	315-0100-00			RES.,FXD,COMP:10 OHM,5%,0.25W	01121	CB1005
R655	321-0394-00			RES.,FXD,FILM:124K OHM,1%,0.125W	75042	CEAT0-1243F
R657	311-1266-00			RES.,VAR,COMP:2.5K OHM,10%,0.5W	73138	62PT-3490-252K
R665	321-0344-00			RES.,FXD,FILM:37.4K OHM,1%,0.124W	75042	CEAT0-3742F
R670	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R675	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R680	321-0183-00			RES.,FXD,FILM:787 OHM,1%,0.125W	75042	CEAT0-7870F
R695	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	75042	CEAT0-4990F
R705	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R710	315-0821-00			RES.,FXD,COMP:820 OHM,5%,0.25W	01121	CB8215
R720	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	75042	CEAT0-2001F
R725	315-0302-00			RES.,FXD,COMP:3K OHM,5%,0.25W	01121	CB3025
R730	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R735	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	75042	CEAT0-2001F
R745	301-0751-00			RES.,FXD,COMP:750 OHM,5%,0.50W	01121	EB7515
R756	311-1556-00			RES.,VAR,NONWIR:50K OHM,20%,0.5W	73138	91A-50001M
R770	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R775	315-0303-00			RES.,FXD,COMP:30K OHM,5%,0.25W	01121	CB3035
R780	315-0103-00			RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R782	311-1007-00			RES.,VAR,NONWIR:20 OHM,20%,0.50W	80294	3329HG48-200
R785	315-0151-00			RES.,FXD,COMP:150 OHM,5%,0.25W	01121	CB1515
R790	301-0271-00			RES.,FXD,COMP:270 OHM,5%,0.50W	01121	EB2715
R795	321-0081-00			RES.,FXD,FILM:68.1 OHM,1%,0.125W	75042	CEAT0-68R10F
R856	311-1563-00			RES.,VAR,NONWIR:1K OHM,20%,0.5W	73138	91A-10000M
R864	311-1559-00			RES.,VAR,NONWIR:10K OHM,20%,0.5W	73138	91A-10001M
R870	315-0912-00			RES.,FXD,COMP:9.1K OHM,5%,0.25W	01121	CB9125
R880	315-0512-00			RES.,FXD,COMP:5.1K OHM,5%,0.25W	01121	CB5125
R885	315-0271-00			RES.,FXD,COMP:270 OHM,5%,0.25W	01121	CB2715
R890	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R930	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125K	75042	CEAT0-3011F
R935	321-0310-00			RES.,FXD,FILM:16.5K OHM,1%,0.125W	75042	CEAT0-1651F
R940	321-0242-00			RES.,FXD,FILM:3.24K OHM,1%,0.125W	75042	CEAT0-3241F
R945	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	75042	CEAT0-3012F
R955	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	75042	CEAT0-1501F

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R960	315-0153-00			RES.,FXD,COMP:15K OHM,5%,0.25W	01121	CB1535
R965	321-0081-00			RES.,FXD,FILM:68.1 OHM,1%,0.125W	75042	CEAT0-68R10F
R968	311-1007-00			RES.,VAR,NONWIR:20 OHM,20%,0.50W	80294	3329HG48-200
R9070	321-0203-00			RES.,FXD,FILM:1.27K OHM,1%,0.125W	75042	CEAT0-1271F
R9080	321-0232-00			RES.,FXD,FILM:2.55K OHM,1%,0.125W	75042	CEAT0-2551F
R9090	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	75042	CEAT0-7501F
R9120	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	75042	CEAT0-7501F
R9130	321-0232-00			RES.,FXD,FILM:2.55K OHM,1%,0.125W	75042	CEAT0-2551F
R9140	321-0202-00			RES.,FXD,FILM:1.24K OHM,1%,0.125W	75042	CEAT0-1241F
R9150	321-0181-00			RES.,FXD,FILM:750 OHM,1%,0.125W	75042	CEAT0-7500F
R9220	321-0373-00			RES.,FXD,FILM:75K OHM, 1%,0.125W	75042	CEAT0-7502F
R9230	321-0327-00			RES.,FXD,FILM:24.9K OHM,1%,0.125W	75042	CEAT0-2492F
R9240	321-0299-00			RES.,FXD,FILM:12.7K OHM,1%,0.125W	75042	CEAT0-1272F
R9250	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	75042	CEAT0-7501F
R9260	321-0816-00			RES.,FXD,FILM:5K OHM,1%,0.125W	91637	MFF1816G50000F
R9270	321-0246-00			RES.,FXD,FILM:3.57K OHM,1%,0.125K	75042	CEAT0-3571F
R9280	321-0234-00			RES.,FXD,FILM:2.67K OHM,1%,0.125W	75042	CEAT0-2671F
R9290	321-0227-00			RES.,FXD,FILM:2.26K OHM,1%,0.125W	75042	CEAT0-2261F
R9700	316-0224-00			RES.,FXD,COMP:220K OHM,10%,0.25W	01121	CB2241
S100	260-1576-00			SWITCH,PUSH:CORRECTED/UNCORRECTED	80009	260-1576-00
S190	260-1576-00			SWITCH,PUSH:CORRECTED/UNCORRECTED	80009	260-1576-00
S9000A,B	262-0974-00			SWITCH ASSY:CORRECTED/UNCORRECTED	80009	262-0974-00
S9000A,B	260-1582-00			SWITCH,ROTARY:RELATIVE CHROMA LEVEL	80009	260-1582-00
S9010	260-0834-00			SWITCH,TOGGLE:POWER-ON	09353	7201-SN
T9900	120-0820-00			XFMR,POWER:	80009	120-0820-00
U659	155-0032-01			INTEGRATED CKT:INPUT PRE-AMPLIFIER	80009	155-0032-01
U851	156-0067-00			INTEGRATED CKT:OPERATIONAL AMPLIFIER	07263	UA741
U1000	156-0312-00			INTEGRATED CKT:VOLTAGE REGULATOR	04713	MC7815CP
U1100	156-0312-00			INTEGRATED CKT:VOLTAGE REGULATOR	04713	MC7815CP
VR690	152-0212-00			SEMICOND DEVICE:ZENER,0.5W,9V,5%	04713	SZ50646

DIAGRAMS, CIRCUIT BOARD ILLUSTRATIONS, MECHANICAL PARTS LIST, AND PACKAGING

Symbols and Reference Designators

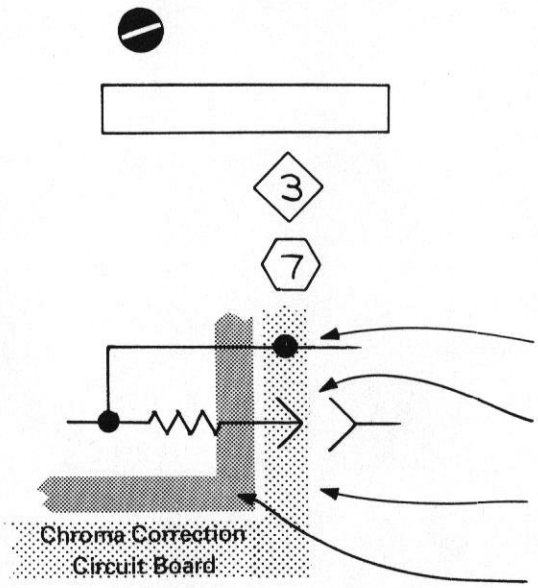
Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).
Resistors = Ohms (Ω)

Symbols used on the diagrams are based on ANSI Y32.2 1970 and IEEE 315 1971

Logic symbology is based on MIL-STD-806B in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The following special symbols are used on the diagrams:



Screwdriver adjustment.

External control or connector.

Refer to diagram number indicated in diamond.

Refer to waveform number indicated in hexagon.

Connection soldered to circuit board.

Connection made to circuit board with interconnecting pin.

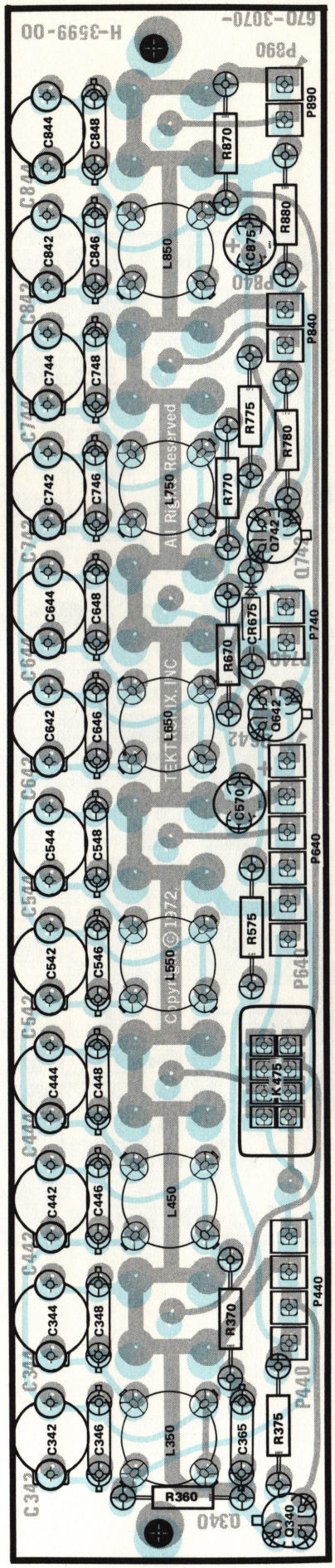
Blue tint encloses components located on circuit board.

Gray tint separates circuits or stages according to function

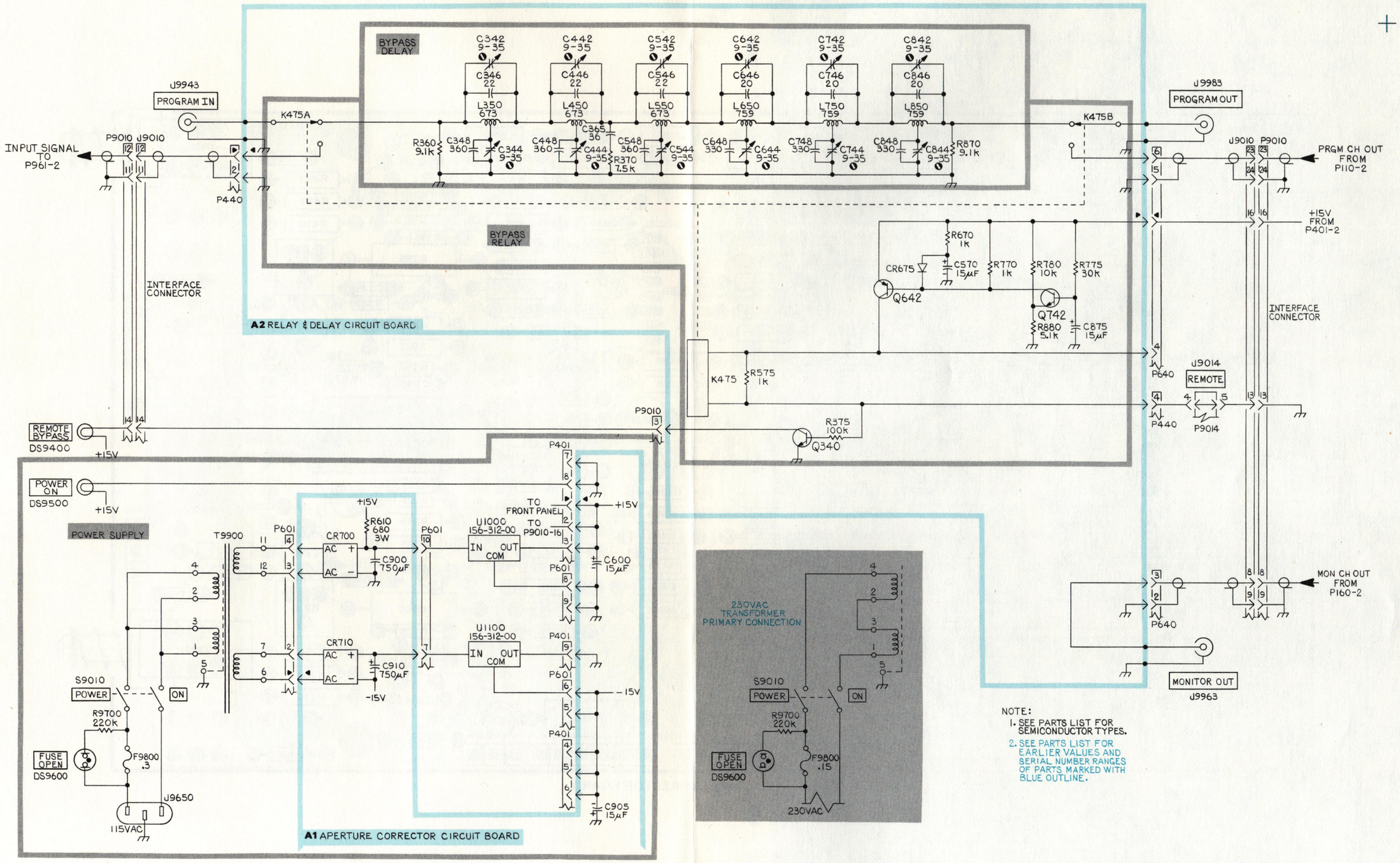
The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

A	Assembly, separable or repairable (circuit board, etc.)
AT	Attenuator, fixed or variable
B	Motor
BT	Battery
C	Capacitor, fixed or variable
CR	Diode, signal or rectifier
DL	Delay line
DS	Indicating device (lamp)
F	Fuse
FL	Filter
H	Heat dissipating device (heat sink, heat radiator, etc.)
HR	Heater
J	Connector, stationary portion
K	Relay
L	Inductor, fixed or variable
LR	Inductor/resistor combination
M	Meter
Q	Transistor or silicon-controlled rectifier
P	Connector, movable portion
R	Resistor, fixed or variable
RT	Thermistor
S	Switch
T	Transformer
TP	Test point
U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
V	Electron tube
VR	Voltage regulator (zener diode, etc.)
Y	Crystal

Ⓐ

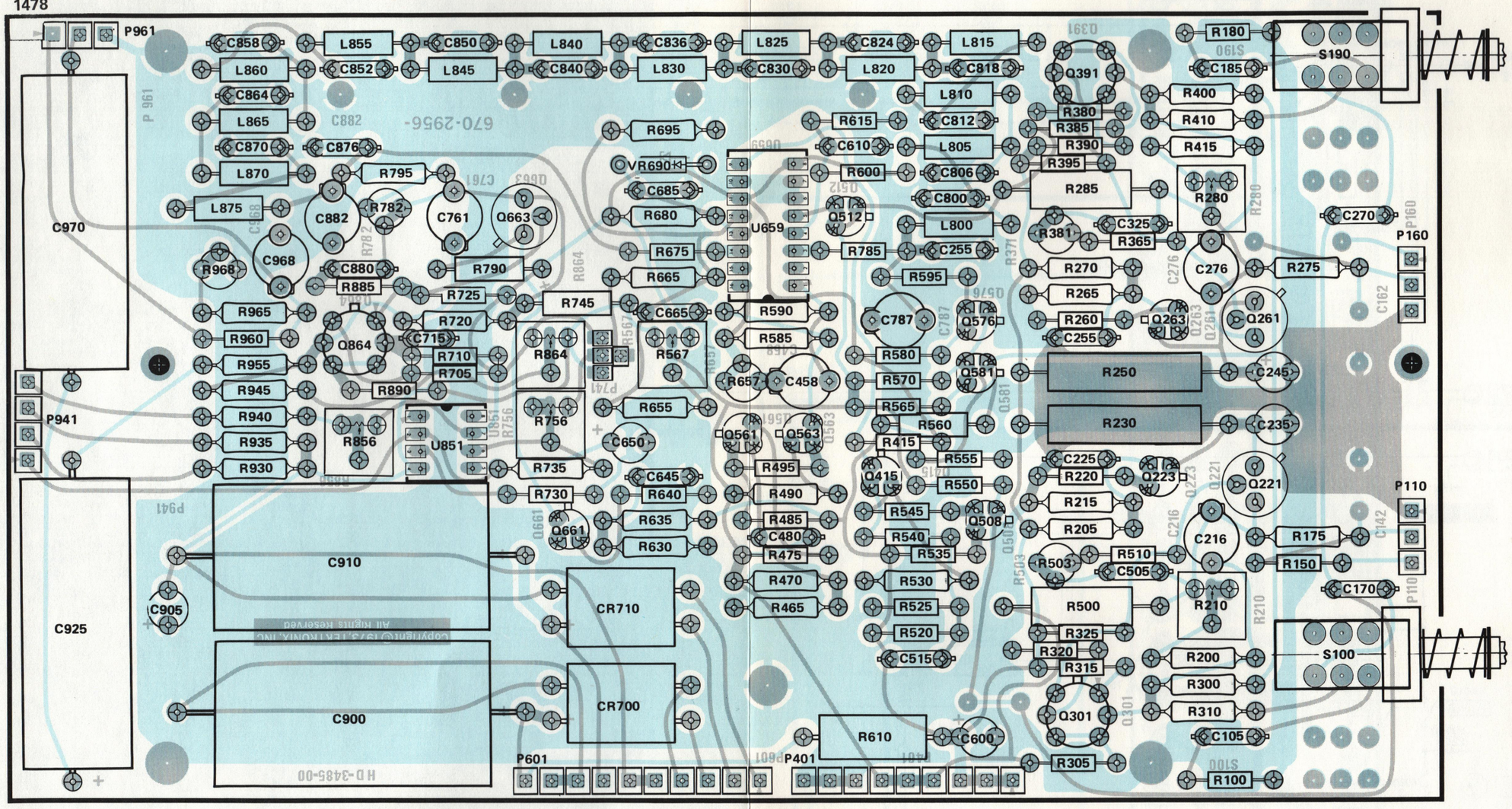


Ⓐ RELAY & DELAY BOARD



NOTE:
1. SEE PARTS LIST FOR SEMICONDUCTOR TYPES.
2. SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS MARKED WITH BLUE OUTLINE.

1478



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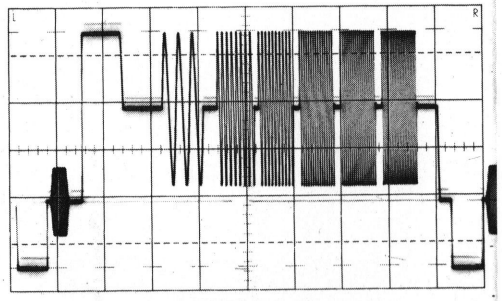
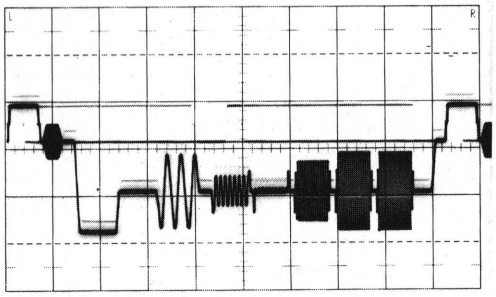
APERTURE CORRECTOR BOARD

1



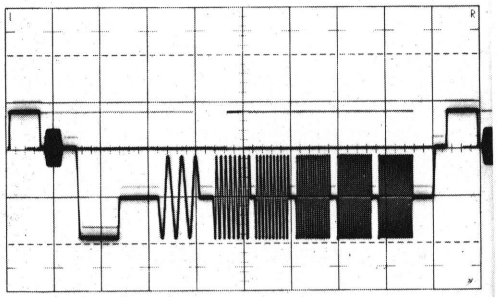
MULTIBURST SIGNAL IN
.2 VOLTS/DIV.

2



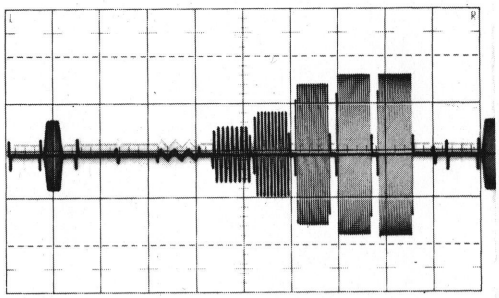
.5 VOLTS/DIV.

3

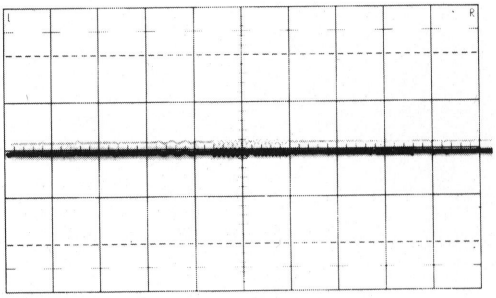


.5 VOLTS/DIV.

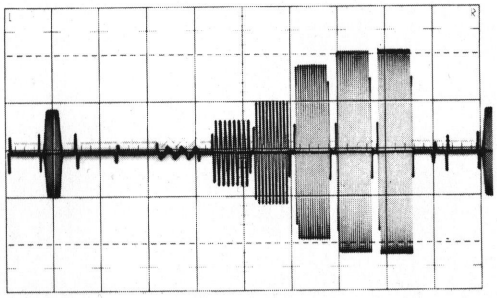
4



1 CHROMA GAIN .60
.1 VOLTS/DIV.

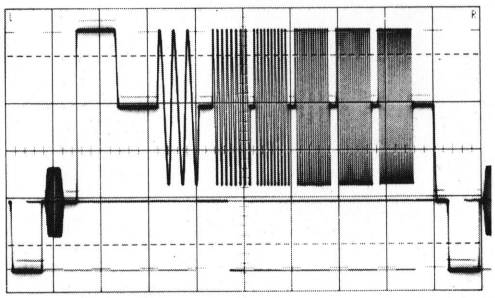


2 CHROMA GAIN 1.00
.1 VOLTS/DIV.



3 CHROMA GAIN 1.50
.1 VOLTS/DIV.

5



MULTIBURST SIGNAL OUT
.2 VOLTS/DIV.
0 V

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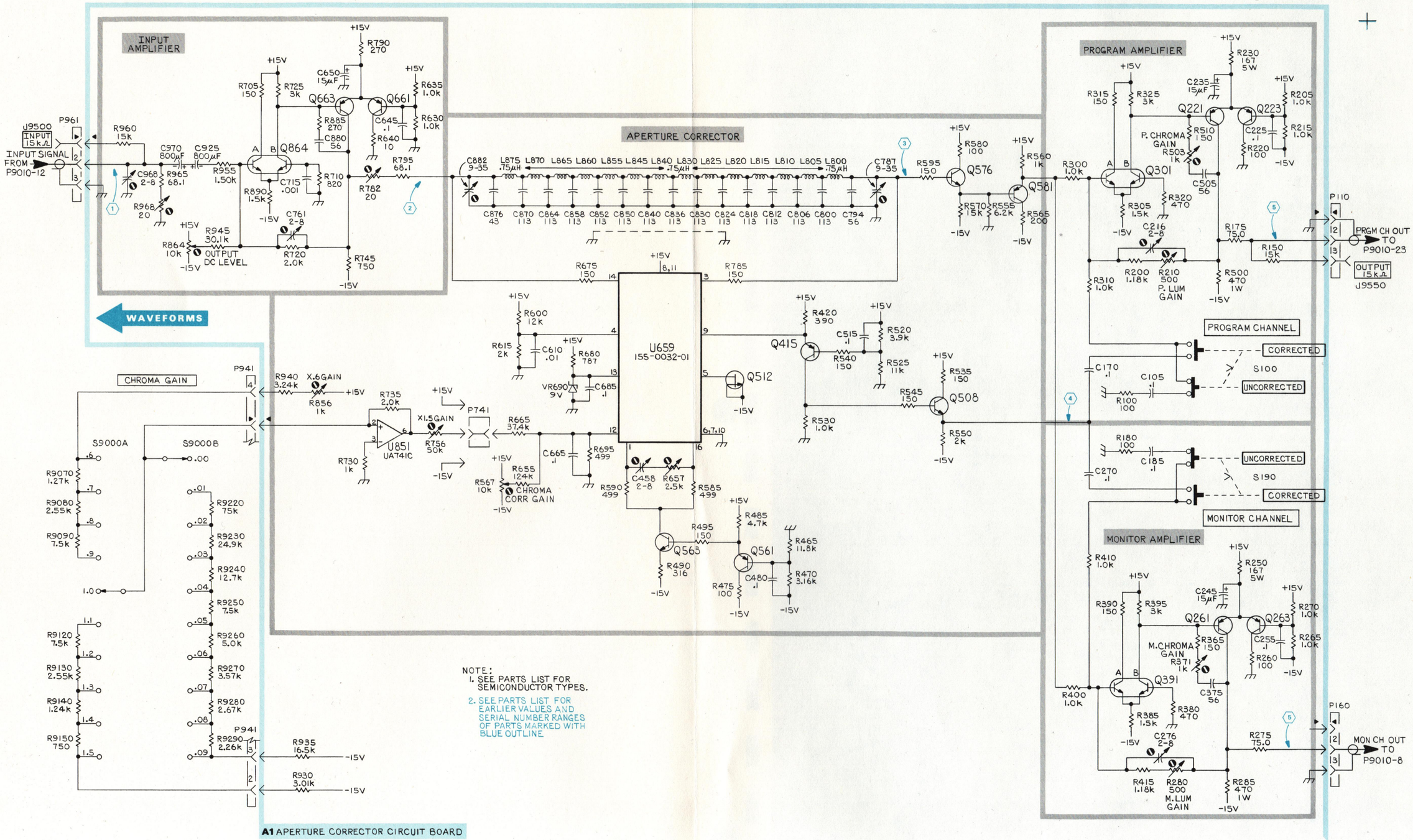

INPUT AMPLIFIER
APERTURE CORRECTOR
PROGRAM AMPLIFIER
MONITOR AMPLIFIER
WAVEFORMS
CHROMA GAIN
U9500 INPUT 15kΩ
INPUT SIGNAL FROM P9010-12
P961
OUTPUT DC LEVEL
U851 UA741C
X1.5GAIN
CHROMA CORR GAIN
U659 155-0032-01
S9000A
S9000B
PROGRAM CHANNEL
CORRECTED
UNCORRECTED
S100
S190
MONITOR CHANNEL
P. CHROMA GAIN
P. LUM GAIN
M.CHROMA GAIN
M.LUM GAIN
PRGM CH OUT TO P9010-23
MON CH OUT TO P9010-8
J9550
P110
P160
P941
P741
NOTE:
1. SEE PARTS LIST FOR SEMICONDUCTOR TYPES.
2. SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS MARKED WITH BLUE OUTLINE.
A1 APERTURE CORRECTOR CIRCUIT BOARD

MECHANICAL REPLACEABLE PARTS LIST

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4

Assembly and/or Component
Attaching parts for Assembly and/or Component
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
Parts of Detail Part
Attaching parts for Parts of Detail Part

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - * - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

CROSS INDEX
MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
02660	Bunker-Ramo Corp., The, Amphenol Connector Div.	2801 S. 25th Ave.	Broadview, IL 60153
09214	General Electric Co., Semi-Conductor Products Dept., Power Semiconductor Products OPN Sec	W. Genesee St.	Auburn, NY 13021
09353	C and K Components, Inc.	103 Morse Street	Watertown, MA 02172
09422	Plastic Stamping Corp.	2216 W. Armitage Ave.	Chicago, IL 60647
12327	Freeway Washer and Stamping Co.	P. O. Box 05206	Cleveland, OH 44105
22526	Berg Electronics, Inc.	Youk Expressway	New Cumberland, PA 17070
24931	Specialty Connector Co., Inc.	3560 Madison Ave.	Indianapolis, IN 46227
71785	TRW Electronic Components, Cinch Div.	1501 Morse Ave.	Elk Grove Village, IL 60007
73743	Fischer Special Mfg. Co.	446 Morgan St.	Cincinnati, OH 45206
73803	Texas Instruments, Inc., Metallurgical Materials Div.		Attleboro, MA 02703
74445	Holo-Krome Co.	31 Brook St. West	Hartford, CT 06110
75915	Littelfuse, Inc.	800 E. Northwest Hwy	Des Plaines, IL 60016
78189	Illinois Tool Works, Inc. Shakeproof Division	St. Charles Road	Elgin, IL 60126
79136	Waldes, Kohinoor, Inc.	47-16 Austel Place	Long Island City, NY 11101
80009	Tektronix, Inc.	P. O. Box 500	Beaverton, OR 97005
82389	Switchcraft, Inc.	5555 N. Elston Ave.	Chicago, IL 60630
83385	Central Screw Co.	2530 Crescent Dr.	Broadview, IL 60153
94222	Southco, Inc.		Lester, PA 19113
95987	Weckesser Co., Inc.	4444 West Irving Park Rd.	Chicago, IL 60641
98291	Sealectro Corp.	225 Hoyt	Mamroneck, NY 10544
98978	International Electronic Research Corp.	135 W. Magnolia Ave.	Burbank, CA 91502

ABBREVIATIONS

"	INCH	FLH	FLAT HEAD	PWR	POWER
#	NUMBER SIZE	FLTR	FILTER	RCPT	RECEPTACLE
ACTR	ACTUATOR	FR	FRAME or FRONT	RES	RESISTOR
ADPTR	ADAPTER	FSTNR	FASTENER	RGD	RIGID
ALIGN	ALIGNMENT	FT	FOOT	RLF	RELIEF
AL	ALUMINUM	FXD	FIXED	RTNR	RETAINER
ASSEM	ASSEMBLED	GSKT	GASKET	SCH	SOCKET HEAD
ASSY	ASSEMBLY	HDL	HANDLE	SCOPE	OSCILLOSCOPE
ATTEN	ATTENUATOR	HEX	HEXAGON	SCR	SCREW
AWG	AMERICAN WIRE GAGE	HEX HD	HEXAGONAL HEAD	SE	SINGLE END
BD	BOARD	HEX SOC	HEXAGONAL SOCKET	SECT	SECTION
BRKT	BRACKET	HLCPS	HELICAL COMPRESSION	SEMICOND	SEMICONDUCTOR
BRS	BRASS	HLEXT	HELICAL EXTENSION	SHLD	SHIELD
BRZ	BRONZE	HV	HIGH VOLTAGE	SHLDR	SHOULDERED
BSHG	BUSHING	IC	INTEGRATED CIRCUIT	SKT	SOCKET
CAB	CABINET	ID	INSIDE DIAMETER	SL	SLIDE
CAP	CAPACITOR	INDENT	INDENTIFICATION	SLFLKG	SELF-LOCKING
CER	CERAMIC	IMPLR	IMPELLER	SLVG	SLEEVING
CHAS	CHASSIS	IN	INCH	SPR	SPRING
CKT	CIRCUIT	INCAND	INCANDESCENT	SQ	SQUARE
COMP	COMPOSITION	INSUL	INSULATOR	SST	STAINLESS STEEL
CONN	CONNECTOR	INTL	INTERNAL	STL	STEEL
COV	COVER	LPHLDR	LAMPHOLDER	SW	SWITCH
CPLG	COUPLING	MACH	MACHINE	T	TUBE
CRT	CATHODE RAY TUBE	MECH	MECHANICAL	TERM	TERMINAL
DEG	DEGREE	MTG	MOUNTING	THD	THREAD
DWR	DRAWER	NIP	NIPPLE	THK	THICK
ELCTRN	ELECTRON	NON WIRE	NOT WIRE WOUND	TNSN	TENSION
ELEC	ELECTRICAL	OBD	ORDER BY DESCRIPTION	TPG	TAPPING
ELECLT	ELECTROLYTIC	OD	OUTSIDE DIAMETER	V	VOLTAGE
ELEM	ELEMENT	PH BRZ	PHOSPHOR BRONZE	VAR	VARIABLE
EPL	ELECTRICAL PARTS LIST	PL	PLAIN or PLATE	W/	WITH
EQPT	EQUIPMENT	PLSTC	PLASTIC	WSHR	WASHER
EXT	EXTERNAL	PN	PART NUMBER	XFMR	TRANSFORMER
FLEX	FLEXIBLE	PNH	PAN HEAD	XSTR	TRANSISTOR

FIGURE 1 EXPLODED

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-1	390-0276-00			1	CABINET,TOP:	80009	390-0276-00
	- - - - - -			-	CABINET TOP INCLUDES:		
-2	355-0134-00			11	STUD,TURNLOCK F:FLAT HEAD STEEL	94222	82-14-140-16
-3	214-0389-00			11	FSTNR,RETAINER:SPLIT RING	94222	82-32-101-17
-4	351-0104-00			1	SLIDE SECT:DWR.(PAIR)	80009	351-0104-00
					(ATTACHING PARTS)		
-5	212-0004-00			4	SCREW,MACHINE:8-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
-6	354-0025-00			2	RING,RETAINING:	79136	5555-18
-7	210-0894-00			2	WASHER,NONMETAL:0.190 ID X 0.438 INCH OD	09422	OBD
-8	213-0216-00			2	THUMBSCREW:10-32 X 0.750 INCH LONG,SST	80009	213-0216-00
-9	367-0160-00			2	HANDLE:CARRYING	80009	367-0160-00
					(ATTACHING PARTS FOR EACH)		
-10	211-0014-00			2	SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
					- - - * - - -		
-11	407-1073-00			2	BRACKET,ANGLE:	80009	407-1073-00
					(ATTACHING PARTS FOR EACH)		
-12	212-0004-00			2	SCREW,MACHINE:8-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
-13	260-0834-00			1	SWITCH,TOGGLE:POWER,W/HARDWARE	09353	7201-SN
-14	131-0779-00			2	JACK,TIP:GRAY	98291	016-8010
-15	366-1161-59			2	PUSH BUTTON:CORRECTED	80009	366-1161-59
-16	366-1161-60			2	PUSH BUTTON:UNCORRECTED	80009	366-1161-60
-17	426-0568-00			4	FRAME:PUSH BUTTON	80009	426-0568-00
-18	426-0360-01			1	FR,KNOB WINDOW:SINGLE	80009	426-0360-01
					(ATTACHING PARTS)		
-19	211-0541-00			2	SCREW,MACHINE:6-32 X 0.25",100 DEG,FLH STL	83385	OBD
					- - - * - - -		
-20	366-0164-05			1	KNOB:BLACK,0-9 WITH SETSCREW	80009	366-0164-05
	213-0004-00			1	SETSCREW:6-32 X 0.188 INCH,HEX SOC,STL	74445	OBD
-21	366-0167-04			1	KNOB:BLACK,0.6-1.5 WITH SETSCREW	80009	366-0167-04
	213-0004-00			1	SETSCREW:6-32 X 0.188 INCH,HEX SOC,STL	74445	OBD
-22	- - - - - -			1	SWITCH,ROTARY:CONCENTRIC(SEE S900A/B EPL)		
					(ATTACHING PARTS)		
-23	210-0413-00			1	NUT,PLAIN,HEX:0.375-32 X 0.50 INCH,STL	73743	3145-402
-24	210-0012-00			1	WASHER,LOCK:INTL,0.375 ID X 0.50"OD,STL	78189	1220-02-00-0541C
-25	406-0757-00			1	BRKT,ELEC SW:	80009	406-0757-00
					- - - * - - -		
-26	333-1794-00			1	PANEL,FRONT:	80009	333-1794-00
					(ATTACHING PARTS)		
-27	210-0457-00			1	NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-28	200-0609-00			1	BASE,LAMPHOLDER:	80009	200-0609-00
-29	378-0541-00			1	LENS,LIGHT:FROSTED	80009	378-0541-00
-30	352-0084-00			1	HOLDER,NEON:	80009	352-0084-00
-31	200-0935-00			2	BASE,LAMPHOLDER:	80009	200-0935-00
-32	378-0602-00			1	LENS,LIGHT:GREEN	80009	378-0602-00
-33	378-0602-02			1	LENS,LIGHT:RED	80009	378-0602-02
-34	352-0157-01			2	LAMPHOLDER:BLACK	80009	352-0157-01
-35	- - - - - -			1	CKT BOARD ASSY:--APERATURE(SEE A1 EPL)		
					(ATTACHING PARTS)		
-36	211-0116-00			4	SCR,ASSM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
					- - - * - - -		
	- - - - - -			-	CKT BOARD ASSY INCLUDES:		
-37	131-0589-00			32	CONTACT,ELEC:0.46 INCH LONG	22526	47350
	131-0608-00			4	CONTACT,ELEC:0.365 INCH LONG	22526	47357
-38	131-0998-00			1	BUSS BAR:9 TERM,8.132 INCH LONG,CUT TO FIT	80009	131-0998-00
-39	136-0235-00			3	SOCKET,XSTR:6 PIN ROUND	71785	133-96-12-062
-40	136-0252-04			47	SOCKET,CONN PIN:SINGLE	22526	75060-001
-41	136-0260-02			1	SOCKET,IC:16 PIN,INLINE	73803	C931602
-42	260-1576-00			2	SWITCH,PUSH:DOUBLE	80009	260-1576-00
-43	361-0384-00			8	SPACER,SWITCH:RED,0.133 INCH LONG	80009	361-0384-00
-44	385-0033-00			1	INS,STANDOFF:0.625 INCH LONG	80009	385-0033-00
					(ATTACHING PARTS)		
-45	211-0504-00			1	SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
-46	214-0269-00			2	HEAT SINK,ELEC:TRANSISTOR	98978	TDX032-075
-47	131-0707-00			2	CONNECTOR,TERM:0.50 INCH LONG(22-26 AWG)	22526	47439
-48	352-0169-00			1	HOLDER,TERM CON:2 WIRE(BLACK)	80009	352-0169-00

FIGURE 1 EXPLODED (cont)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-49	- - - - - -			1		TRANSFORMER:(SEE T9900 EPL)		
						(ATTACHING PARTS)		
-50	211-0513-00			4		SCREW,MACHINE:6-32 X 0.625 INCH,PNH STL	83385	OBD
-51	210-0802-00			4		WASHER,FLAT:0.150 ID X 0.312 INCH OD,STL	12327	OBD
-52	210-0006-00			4		WASHER,LOCK:INTL,0.461 ID X 0.283"OD,STL	78189	OBD
-53	129-0391-00			4		POST,ELEC-MECH:HEX 0.375 X 0.375 INCH LONG	80009	129-0391-00
						- - - * - - -		
-54	343-0002-00			2		CLAMP,LOOP:CABLE	95987	3-16-6B
						(ATTACHING PARTS FOR EACH)		
-55	211-0025-00			1		SCREW,MACHINE:4-40 X 0.375"100 DEG,FLH STL	83385	OBD
-56	210-0586-00			1		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	83385	OBD
-57	210-0803-00			1		WASHER,FLAT:0.150 ID X 0.375 INCH OD,STL	12327	OBD
						- - - * - - -		
-58	- - - - - -			1		INTEGRATED CKT:(SEE U1000 EPL)		
						(ATTACHING PARTS)		
-59	210-0586-00			1		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	83385	OBD
						- - - * - - -		
-60	- - - - - -			1		INTEGRATED CKT:(SEE U1100 EPL)		
						(ATTACHING PARTS)		
-61	210-0586-00			1		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	83385	OBD
-62	210-1171-00			1		WASHER,SHLDR:0.116 ID X 0.138" OD,NYLON	09214	A7148516P2
-63	342-0163-00			1		INSULATOR:MICA,0.675 X 0.625 INCH	80009	342-0163-00
						- - - * - - -		
-64	131-1084-00			1		CONN,RECP,ELEC:AC INPUT	82389	EAC-301
						(ATTACHING PARTS)		
-65	211-0012-00			2		SCREW,MACHINE:4-40 X 0.375 INCH,PNH STL	83385	OBD
-66	210-0586-00			2		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	83385	OBD
-67	352-0362-00			1		FUSEHOLDER:WITH MOUNTING HARDWARE	75915	345001
-68	131-0149-00			1		CONN,RCPT,ELEC:MALE 24 PIN	02660	26-159-24
						(ATTACHING PARTS)		
-69	211-0012-00			2		SCREW,MACHINE:4-40 X 0.375 INCH,PNH STL	83385	OBD
-70	210-0201-00			2		TERMINAL,LUG:0.094 INCH DIAMETER,SE	78189	2104-04-00-2502N
-71	210-0586-00			2		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	83385	OBD
						- - - * - - -		
-72	210-0202-00			1		TERMINAL,LUG:SE #6	78189	2104-06-00-2520N
						(ATTACHING PARTS)		
-73	210-0457-00			1		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-74	441-1186-00			1		CHAS,ELEC EQUIP:MAIN	80009	441-1186-00
	- - - - - -			-		CHASSIS INCLUDES:		
-75	214-0388-00			11		FASTENER RCPT:LEAF SPRING	94222	82-35-295-15
						(ATTACHING PARTS FOR EACH)		
-76	210-0657-01			2		EYELET:0.089 OD,BARREL,0.218 INCH LONG	80009	210-0657-01
						- - - * - - -		
-77	129-0105-00			2		POST,ELEC-MECH:0.218 OD X 0.219 INCH LONG	80009	129-0105-00
-78	131-0325-00			1		CONN,PLUG,ELEC:MALE,24 PIN	71785	57-30240398
-79	131-0324-00			1		CONN,RCPT,ELEC:FEMALE,24 PIN	71785	57-40240398
						(ATTACHING PARTS)		
-80	211-0062-00			2		SCREW,MACHINE:2-56 X 0.312 INCH,PNH STL	83385	OBD
-81	210-0001-00			2		WASHER,LOCK:0.092 ID X 0.180 INCH OD,STL	78189	1202-00-00-0541C
-82	210-0405-00			2		NUT,PLAIN,HEX:2-56 X 0.188 INCH,BRS	73743	2X12157-402
						- - - * - - -		
-83	131-0148-00			1		CONN,RCPT,ELEC:FEMALE,24 PIN	02660	26-190-24-1004
						(ATTACHING PARTS)		
-84	211-0014-00			2		SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
-85	129-0371-00			2		POST,ELEC-MECH:0.25 HEX X 0.83 INCH LONG	80009	129-0371-00
						- - - * - - -		
-86	131-1097-00			6		CONN,RCPT,ELEC:BNC,WITH HARDWARE	24931	28JR220-1
-87	- - - - - -			1		CKT BOARD ASSY:--RELAY/DELAY(SEE A2 EPL)		
	- - - - - -			-		CKT BOARD ASSY INCLUDES:		
-88	131-0589-00			16		CONTACT,ELEC:0.46 INCH LONG	22526	47350
-89	136-0252-04			17		SOCKET,CONN PIN:SINGLE	22526	75060-001
-90	441-1059-00			1		CHAS,ELEC EQUIP:INTERFACE	80009	441-1059-00
-91	179-2126-00			1		WIRING HARNESS:MAIN	80009	179-2126-00
	- - - - - -			-		WIRING HARNESS INCLUDES:		
-92	131-0792-00			3		CONNECTOR,TERM:0.58 INCH LONG(18-20 AWG)	22526	46221
	131-0621-00			17		CONNECTOR,TERM:0.58 INCH LONG(22-26 AWG)	22526	46231
	131-0622-00			2		CONNECTOR,TERM:0.58 INCH LONG(28-32 AWG)	22526	46241
-93	352-0199-00			2		HOLDER,TERM CON:3 WIRE(BLACK)	80009	352-0199-00
-94	352-0200-00			1		HOLDER,TERM CON:4 WIRE(BLACK)	80009	352-0200-00
-95	352-0205-00			1		HOLDER,TERM CON:9 WIRE(BLACK)	80009	352-0205-00
-96	352-0206-00			1		HOLDER,TERM CON:10 WIRE(BLACK)	80009	352-0206-00

FIGURE 1 EXPLODED (cont)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Serial/Model No. Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-	179-2127-00			1		WIRING HARNESS:RELAY/DELAY	80009	179-2127-00
	- - - - - -			-		WIRING HARNESS INCLUDES:		
	131-0792-00			3		CONNECTOR,TERM:0.58 INCH LONG(18-20 AWG)	22526	46221
	131-0621-00			3		CONNECTOR,TERM:0.58 INCH LONG(22-26 AWG)	22526	46231
	131-0622-00			3		CONNECTOR,TERM:0.58 INCH LONG(28-32 AWG)	22526	46241
	352-0200-00			1		HOLDER,TERM CON:4 WIRE(BLACK)	80009	352-0200-00
-97	352-0202-00			1		HOLDER,TERM CON:6 WIRE(BLACK)	80009	352-0202-00

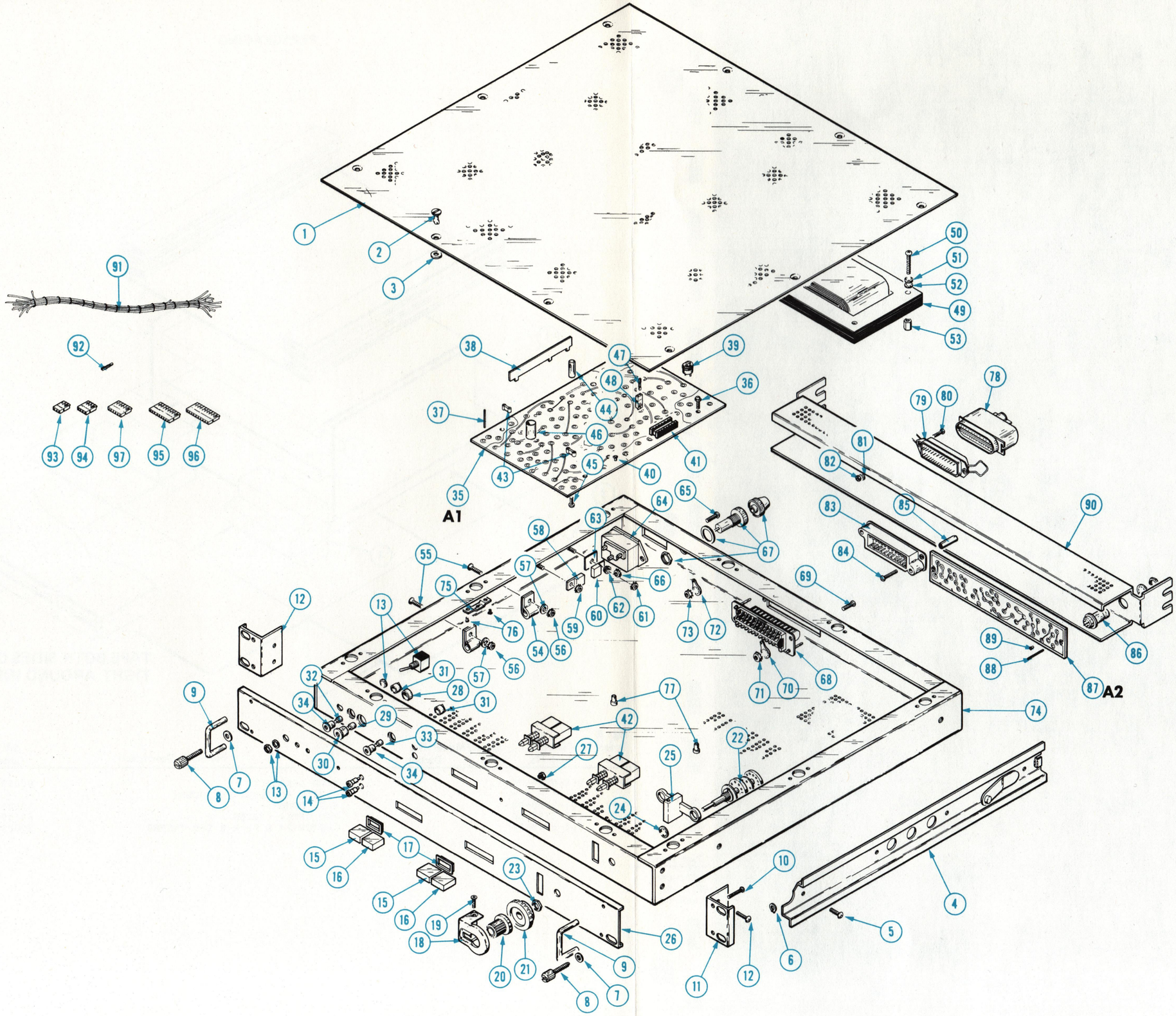

A1
A2

FIG. 2 ACCESSORIES &
FIG. 3 REPACKAGING

ACCESSORIES

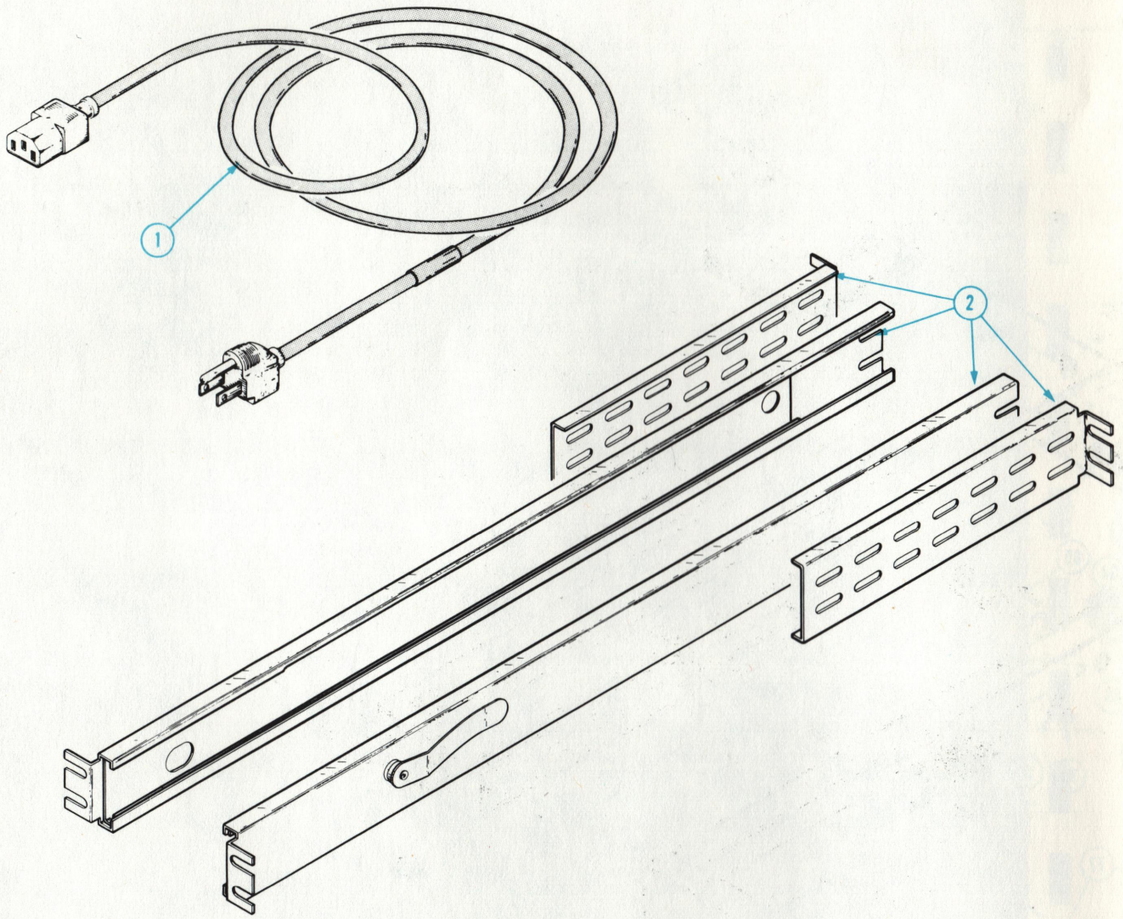


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty 1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-1	161-0066-00			1	CABLE ASSY,PWR:8 FOOT LONG	80009	161-0066-00
-2	351-0331-00			1	SLIDE GUIDE:(PAIR)	80009	351-0331-00
	070-1640-00			1	MANUAL,TECH:(NOT SHOWN)	80009	070-1640-00

REPACKAGING

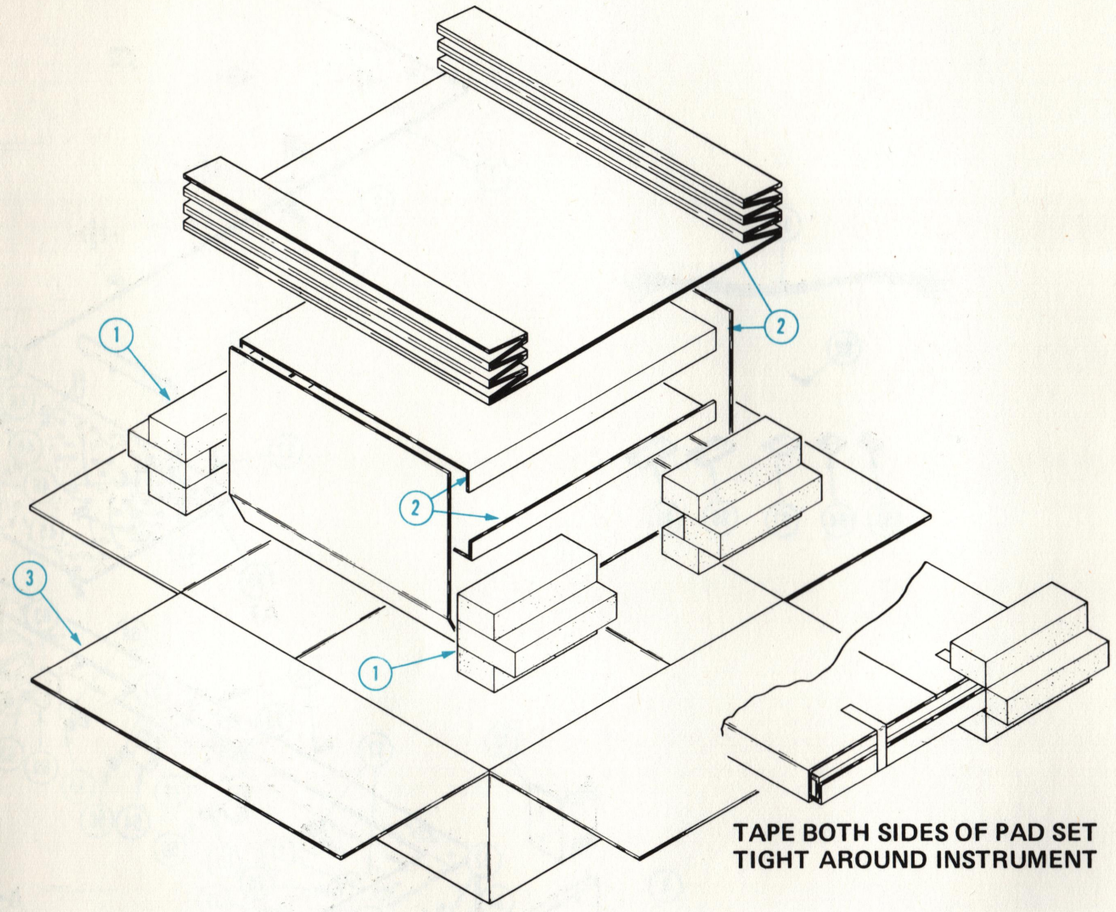


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty 1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-	065-0190-00			1	CARTON ASSEMBLY:	80009	065-0190-00
	- - + - - -			-	CARTON ASSEMBLY INCLUDES:		
-1	004-1220-00			4	PAD,CORNER:	80009	004-1220-00
-2	004-1157-00			1	PAD SET:4 PIECES	80009	004-1157-00
-3	004-0849-00			1	CARTON:24 X 23 X 8.250 INCHES	80009	004-0849-00

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Sections of the manual are often printed at different times, so some of the information on the change pages may already be in your manual. Since the change information sheets are carried in the manual until ALL changes are permanently entered, some duplication may occur. If no such change pages appear in this section, your manual is correct as printed.

TEXT CORRECTIONS

Page 10, right column

CHANGE step 10b to read as follows:

b. Rotate the variable resistor back and forth and adjust C458, R657, and C787 to pass the vector tip through 0 on the horizontal axis. Adjustment of R567 may be necessary to pass the vector tip through zero.

Pages 10 and 11

CHANGE step 11 to read as follows:

11. Adjust 2T and T Pulse Tracking

a. Remove the variable resistor and replace P741. Make the operating change required to change the Test Signal Generator to 2T pulse, consult the Test Signal Generator instruction manual.

b. Set the front panel CHROMA GAIN to 1.59. Depress PROGRAM CHANNEL CORRECTED and observe the Waveform Monitor.

c. Adjust the 2T Pulse Tracking, C700, for equal amounts of 2T pulse negative preshoot and baseline overshoot.

d. Return the Test Signal Generator to T pulse and adjust P. Chroma Gain, R503, for equal negative preshoot and baseline overshoot of the T pulse.

Interacting Steps

Repeat the preceding six steps until no further adjustment is necessary.

ELECTRICAL PARTS LIST AND SCHEMATIC CORRECTION

CHANGE TO:

C458	281-0092-00	CAP., Var, CER D1:9-35 PF
C794	283-0637-00	CAP., FXD, MICA D:20 PF, +/-0.5 PF, 100 V
C968	281-0092-00	CAP., Var, CER D1:9-35 PF
F9800	159-0030-00	FUSE, CARTRIDGE: 0.3A, 3AG, FAST-BLO

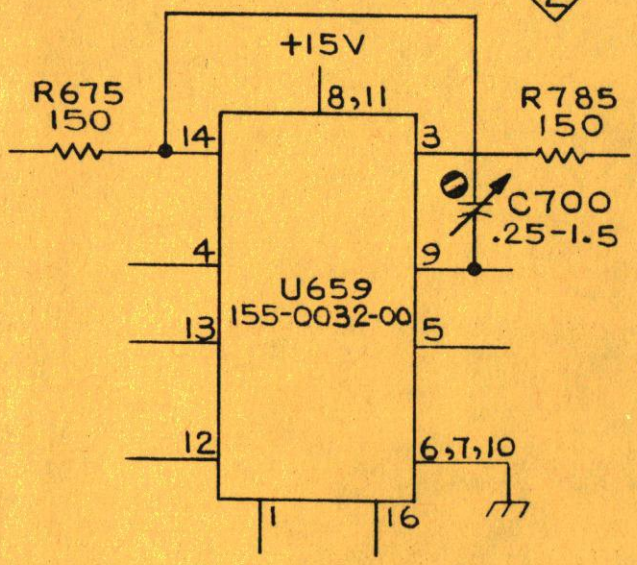
CHANGE TO:

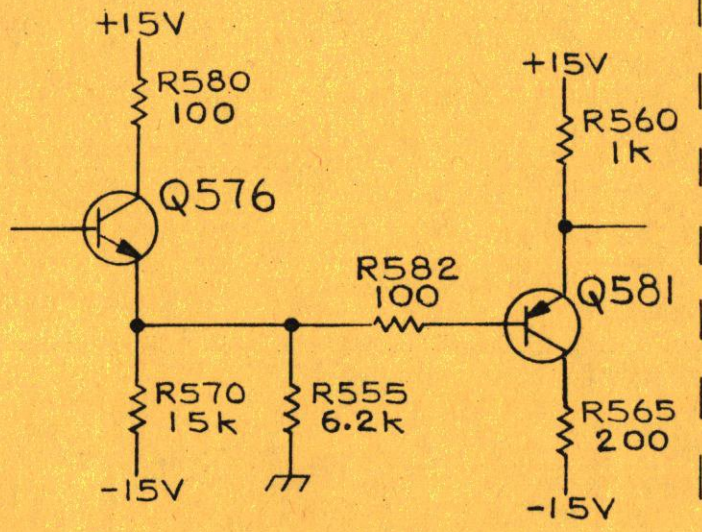
L800	108-0767-00	COIL, FXD, 740 nH
L805	108-0767-00	COIL, FXD, 740 nH
L810	108-0767-00	COIL, FXD, 740 nH
L815	108-0767-00	COIL, FXD, 740 nH
L820	108-0767-00	COIL, FXD, 740 nH
L825	108-0767-00	COIL, FXD, 740 nH
L830	108-0767-00	COIL, FXD, 740 nH
L835	108-0767-00	COIL, FXD, 740 nH
L840	108-0767-00	COIL, FXD, 740 nH
L845	108-0767-00	COIL, FXD, 740 nH
L850	108-0767-00	COIL, FXD, 740 nH
L855	108-0767-00	COIL, FXD, 740 nH
L860	108-0767-00	COIL, FXD, 740 nH
L865	108-0767-00	COIL, FXD, 740 nH
L870	108-0767-00	COIL, FXD, 740 nH
L875	108-0767-00	COIL, FXD, 740 nH
R100	131-0566-00	LINK, TERMINAL CONN. DUMMY RES (0Ω)
R180	131-0566-00	LINK, TERMINAL CONN. DUMMY RES (0Ω)
R595	315-0241-00	RES, FXD, COMP, 240 Ω, 5%, 0.25 W

ADD:

C700	281-0064-00	CAP., VAR, CER D0.25-1.5 PF, 600 V
R145	315-0301-00	RES., 300 Ω (nominal value) selected
R290	315-0301-00	RES., 300 Ω (nominal value) selected
R582	315-0101-00	RES., FXD, COMP: 100 Ω, 5%, 0.25 W

PARTIAL CHROMINANCE LEVEL CORRECTOR ②





PARTIAL CHROMINANCE LEVEL CORRECTOR ②

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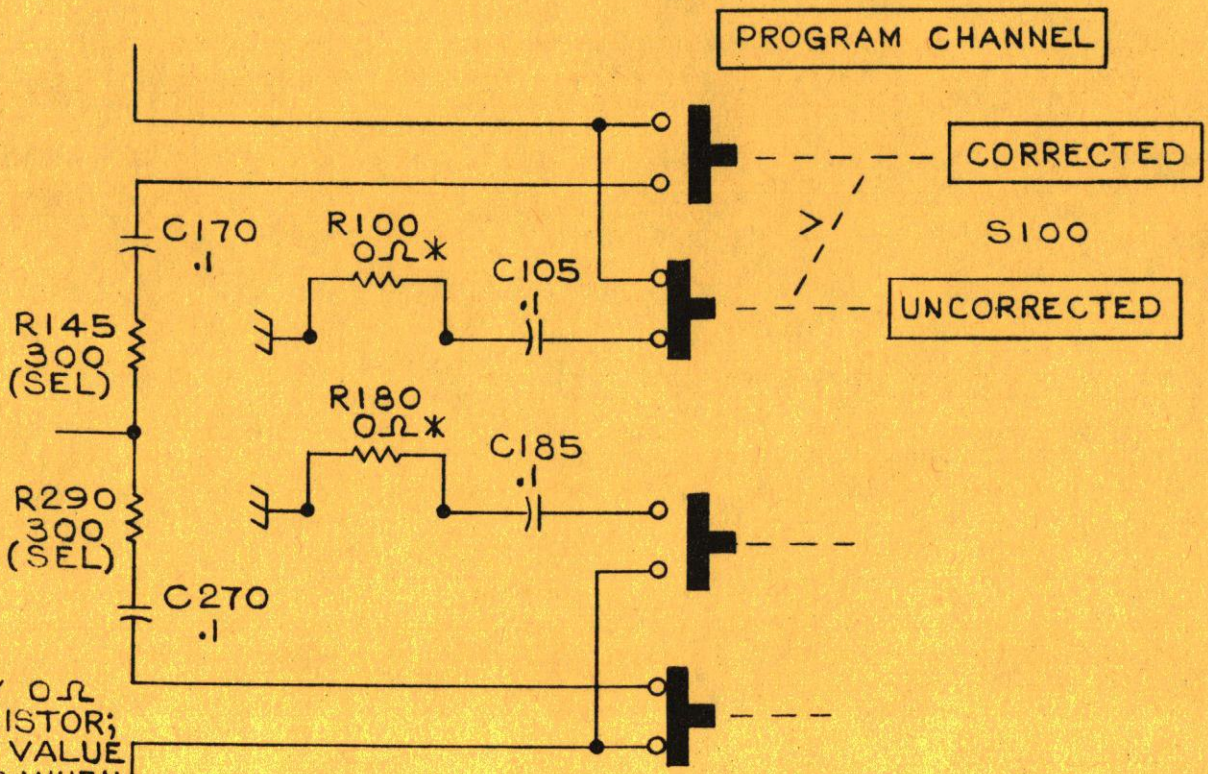

*NORMALLY 0Ω DUMMY RESISTOR; A SPECIFIC VALUE MAY BE USED WHEN CIRCUIT CONDITIONS REQUIRE.